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PERSONAL REMINISCENCES OF LORD LISTER; THE INTRODUCTION AND DEVELOPMENT OF ANTISEPTIC SURGERY IN AMERICA.*

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THE topic selected necessarily must commence with a brief chapter of personal history which may best be narrated as a story.

In common with the great majority of young graduates, at the time of the Civil War I sought to win my spurs by service in the United States volunteer army. By good fortune rather than wisdom I became a general officer at the age of twenty-five. My last and perhaps most difficult service was the sanitary renovation of Charleston.

I was a post-graduate pupil and assistant in the Harvard Medical School the subsequent three years. A large portion of 1869-1870 I spent as a student in the University of Berlin in special training for surgery, for which I thought myself well fitted. I had planned to spend the summer of 1870 as a special pupil of Simpson in Edinburgh, which plan was interrupted by his sudden death. I naturally sought the great surgeon, Syme, only to learn of his very serious illness, soon followed by his death.

At the funeral services there was pointed out to me among the chief mourners a man of medium height, upon whose arm leaned a tall lady in black. I was informed this was Mr. Lister, who had married the daughter of Mr. Syme, but that he was a man little thought of in Edinburgh and had come here from Glasgow because of his distinguished father-in-law. At the same time I was advised not to visit him if I desired to acquire a friendly relationship with the medical profession of Edinburgh. I afterward found that this was a very modest expression of the Scotch intensity of feeling and that the Edinburgh faculty thought it incumbent upon them as a duty to stigmatize Mr. Lister's theories as arrant nonsense.

Very naturally this was sufficient to awaken a curiosity within me and I sought to ascertain, if I might, something of the man and the practical application of his theories. I was received by Mr. Lister with much more than ordinary kindness. He had a few beds in the old Infirmary under his supervision, and the result of the first visit convinced me of the practical value of his work. I was distinctly impressed with the result of two or three resections of the elbow joint in strumous children, where primary repair had supervened and almost without pain or swelling. I was accepted as his special student for the summer and followed him day by day with notebook in hand more than enthusiastic in my devotion to the new teaching.

Mr. Lister had been carefully educated and as early as 1852 and 1853 he published papers of original research. Early after graduation he became a member of the Royal College of Surgeons. For a considerable period he had been assistant to Sir Henry Thompson and later to Mr. Erichsen, leaders in the surgical profession of England, whose teachings were accepted as world-wide authority. By the advice of these masters he sought further instruction under Mr. Syme at the Royal Infirmary in Edinburgh. Mr. Syme was then a brilliant operator and had made an international reputation. Mr. Lister almost at once became his favorite pupil and afterward his son-in-law. Mr. Lister soon began giving lectures upon surgery in Edinburgh, where he remained until 1860, when he was appointed professor of clinical surgery in Glasgow; here he remained until 1869, when he returned to Edinburgh and assumed Mr. Syme's place, teaching clinical surgery until 1877, when he was appointed professor of clinical surgery in Kings College, London, and was actively engaged in the profession until 1893, when he was made emeritus professor of clinical surgery and consulting surgeon to the hospital. Mr. Lister began his bacteriologic research work about 1860. The inspiration for this work was derived from Louis Pasteur. Pasteur was five years Mr. Lister's senior. He had been well educated in science and was a special pupil of the famous chemist, Dumas.

Liebig was the most illustrious chemist of Europe and it was considered heterodoxy to in any way question the opinions of this most learned professor. Liebig taught that fermentation and

*Address delivered before the Cambridge Medical Society.

decomposition were chemical and not vital processes, due in large degree to the action of oxygen in or upon organic fluids.

As early as 1860 Pasteur published his studies upon fermentation and spontaneous generation, which almost at once found scientific acceptation.

The microscope had been so improved upon that it was not difficult to differentiate accurately objects hitherto invisible, and thus armed a new field of investigation was easily opened. Our own professor, Jeffries Wyman, of Cambridge, was an original investigator in this field and showed that fluids could be rendered permanently sterile by heat and that in such preparations fermentation and so-called spontaneous generation were impossible.

Having accepted these facts as demonstrated, it was not far afield for Mr. Lister to adopt as a working hypothesis that it was not oxygen or the gaseous constituents of the air that wrought these changes, but the rather minute organisms suspended in it. In many ways he sought demonstration of proof. It is not the purpose of this paper to review the history of bacteriology, yet certain of the simple experiments of Mr. Lister demonstrating his conviction that the atmosphere was the chief carrier of germ life are worthy of reference. Flasks containing sterile organic fluids subject to the same surrounding conditions were both freely open to the atmosphere, but the one bent so that its mouth was turned directly downward showed this remarkable change. The fluid in the upright flask promptly underwent decomposition while the other protected from gravitating particles in aerial suspension remained unchanged. The next experimental observation shows that when the sterile flask was lightly plugged with sterile cotton to serve as a filter of the air, fermentation did not ensue. The removal of the cotton for a few minutes and fermentative changes promptly supervened; a simple and complete demonstration that these changes were not dependent upon the atmosphere, but upon organic particles floating therein.

Contrary to that which has been charged, Mr. Lister was by no means ignorant or oblivious to the fact that infectious material might consist in and probably did pertain to the many and varied substances with which man was constantly in contact. Even at the early period when I was his pupil he considered wound infection as due to putrefaction, incident upon germs contained in it, but that the air was almost of necessity the most difficult factor for control in the prevention of suppuration in wounds. I shall never forget the charming simplicity and modesty of the man as he earnestly reasoned with his pupils concerning atmospheric disinfection. A simple fracture almost invariably healed by primary union. A small puncture of the skin from a sharp fragment changed the whole aspect of the problem. Here suppuration usually followed, producing one of the most dangerous varieties of wounds, of which a high rate of mortality existed. It certainly could not be due to the slight wound of the skin, which in itself would not have been serious. It must be dependent upon a something from without which, introduced into the deeper structures, poisoned the body in a most dangerous degree. That something could be nothing else or less than the organic germ substances ever present in the surrounding media which, thus introduced into the body, rapidly developed to endanger the organism.

Of course, at that period the science of bacteriology was in its infancy and the different forms and varieties of minute organisms were unknown.

Carbolic acid was his first and most efficient remedy, and the history of its application is known to every surgeon. In compound fractures Mr. Lister's first application was the pure carbolic acid frequently reapplied to form a crust. Later he mixed a preparation composed of linseed oil, carbonate of lime and carbolic acid, then called Lister's "antiseptic putty."

Mr. Lister's introductory lecture, as the successor of Mr. Syme to the chair of clinical surgery in Edinburg in 1869, was "a new method of wound treatment; the 'antiseptic system' based upon the truth of the germ theory of putrefaction."

In all the great variety of wound treatment to the very present, now embodied under the name of aseptic surgery, this great underlying truth first enunciated by Mr. Lister remains; that wound infection comes from without and that it may by appropriate measures be prevented and usually eliminated. Mr. Lister at this early day of my pupilage was an extremely modest, sensitive man and of a retiring disposition. He had been criticized without mercy, and little short of the inspiration of a great conviction could have held him at that time to a seemingly thankless task.

I one day thoughtlessly hurt him most seriously when he was showing me a breast excision, followed by primary union, and with a just pride said, "had this patient been a princess what would they then say of antiseptic surgery?" I facetiously replied, "but, Mr. Lister, what a pity you do not practice surgery in America, where every patient is a king or a queen." He thought his most de-

voted pupil was indulging in satire rather than praise. Most justly has Mr. Lister been honored and in his own country, where more commonly genius is overlooked.

Queen Victoria made him a baronet in 1883 and in 1897 he was raised to the peerage with the title "Baron Lister," *the only member of the medical profession ever so honored in England.* I remember him as a painstaking rather than brilliant operator, as an enthusiastic, but quiet worker, dominated by skill and a modest effacement of self-aggrandizement.

I had been astonished in studying abdominal surgery under the instruction of Sir Spencer Wells, of London, and Mr. Keith, of Edinburgh. The latter held at that time the world's record of the largest number of abdominal consecutive sections without death. Although they had no preconceived theories and troubled themselves not at all with the new idea of germ infection, in scrupulous cleanliness and care, they were hardly surpassed in the surgical technic of to-day.

When I returned from Mr. Lister's clinic in the latter part of 1870 his operative technic consisted chiefly of the following: During the operation the skin and surrounding parts having been carefully cleansed, were kept as free from contamination as possible. For this purpose carbolic acid, applied in various forms, was his chief reliance. All wounds of any magnitude were very carefully drained, since, in common with his predecessors, he felt that the exudates were particularly liable to decomposition. Although he used silk in some degree for ligatures, which had been dipped in melted wax into which carbolic acid had been incorporated, carefully drawn while still hot through a folded cloth dressing, his chief reliance was upon catgut. This had been carefully prepared by carbolic disinfection and retained for some hours in the carbolic acid saturated aqueous solution to which a minute quantity of chromic acid had been added. These ligatures were permanently put up in carbolized oil.

His first contribution to wound treatment was the ligation of all bleeding vessels with catgut, cut short and left deep in the wound. His comparative studies had shown that the catgut surrounding the vessel was slowly absorbed and disappeared without suppuration.

These interesting studies were favorably commented upon by the medical profession in general, and they form one of the most brilliant chapters in Mr. Lister's contribution to surgery.

Owing to the laws of Great Britain, preventing experimentation upon living animals, Mr. Lister went to France for the prosecution of this study. I have every reason to believe that Mr. Lister was entirely ignorant of the work of Dr. Jameson, of Baltimore, who first published a long series of similar studies with equally brilliant results in 1827. Following this period for two decades, the surgeons of America, and even Sir Astley Cooper, of London, ligated vessels with absorbable ligatures. These fell, however, into disuse and seemed to have been utterly forgotten, largely due probably to the character of the wounds, which, as a rule, were infected.

Mr. Lister closed all his wounds with through and through stitches, it never having occurred to him that he could bury sutures as well as ligatures. This probably from the fact that all his wounds were drained and hence not adapted to closure in layers. He emphasized the fact that cell proliferation and absorption was much more active in the deeper layer of the skin; when cutting away the suture its withdrawal showed that these changes were always more pronounced where the ligature was in contact with the sub-epithelial layers.

The dressing of the wound after its closure received from Mr. Lister his most serious and earnest consideration. He was dominated by the thought that the hosts of aerial enemies were ever seeking admission, and how to prevent and destroy them demanded his most earnest effort. All his wounds containing drainage tubes must necessarily for some days give out a continuous free discharge. If this fluid became infected it was almost sure to penetrate the deeper layers of the structures with its usual consequences of suppuration, etc.

Absorbent dressings easily lost their antiseptic qualities and failed in protection. Sheets of rubber or other impermeable material within the outer layers of the absorbent dressing served a purpose of diffusing the secretions. In order that carbolic acid might be permanently retained, Mr. Lister placed great reliance upon the incorporation of it in germ resins and the so-called "lac plaster" was in constant requisition. My large rolls of "lac plaster" greatly puzzled our Custom House officials to determine under what schedule they should be placed for revenue taxation.

Even my former great master, Virchow, protested against the use of high-powered objectives for microscopical examination; that cell differentiation was far more satisfactory at a magnification of 250 diameters and that the picture offered

under higher powers was unsatisfactory and confusing. He ordered my Hartnack microscope for me and permitted one higher objective, a 1/7, to be included under protest. American mechanicians under Spencer led the way in the manufacture of superior objectives of high power. I own one of the most magnificent microscopes of American invention made by Towles, which with its accompanying lenses originally cost $800. The Towles and Wales one-fifteenth inch immersion lenses for differentiation compare favorably with any of more recent make, either of European or American manufacture.

Under a new formula worked out by Abbé, the famous mechanician Zies supplied the profession with splendid high power objectives in the late 70s, which owing to increased illumination became efficient means of practical study. One of the lenses of his early manufacture, a fourteenth, introduced me into a new world of vision, and by it made possible bacterial research work hitherto by me impossible.

I established a well-equipped bacteriological laboratory, obtained the best trained assistants possible and devoted continuous research work in wound infections for fifteen years.

The medical journals of the time willingly permitted the use of their columns, and I suppose my contributions to the American Medical Association would alone fill a volume. I established a private surgical hospital, that I might have exclusive control in care and technic and here the principles of the great master, Mr. Lister, were brought under rigid scrutiny, and many of his methods modified, and as I have thought, improved.

Notwithstanding my enthusiastic devotion to the work, as a life mission, the new teaching was slow in its acceptance and adoption.

Prof. Bigelow, without question, the leading surgical authority in New England, listened patiently to my enthusiastic support of the new teaching and admitted that there might be something in it. He lacked conviction of the truth of its fundamental principles, signally failed as an aseptic operator, and soon condemned the whole business.

His students of this period still remember this very handsome man, who usually operated in a Prince Albert coat, well buttoned at the front, in which he appeared in the operating amphitheatre, stiff with the dried blood over its sleeves and front of many a previous operation. His assistants copied their master with the addition of well waxed ligatures adorning their buttonholes.

The famous Dr. Kimball, of Lowell, witnessed one of my early laparotomies, but could hardly be persuaded in further experience because of the spray which to him was very objectionable. Comparatively little progress was made in the adoption of the new surgical technic in New England, until after it had been accepted and approved by the German operators. Indeed, in England the new teaching was far from general approval until after the International Medical Congress held in London in 1881. This was a most memorable occasion, and none who were present in the great arena, where the final verdict of the world's approval was given to Mr. Lister's revolutionary teaching, will ever forget the long and heated debate.

The surgeons of New York City were sharply divided in their opinions of the new faith; my old friend, Dr. Gouley, of the Bellevue Hospital, was bitter in his denunciation of the "new nonsense" and almost willing to break friendship with its supporters.

Dr. Stephen Smith, on the contrary, early accepted the teaching and faithfully profited by it. In his work on practical surgery, published in 1877, he emphasizes the danger of wound infection from the surgeon's hands and especially the dying epithelium under the finger nails. Dr. James A. Wood accepted the theory of wound infection and devised a most ingenious and in large degree successful method of keeping his wounds absolutely open and subject to a continuous irrigation for some days. Dr. Thomas, of the Woman's Hospital, accepted the teaching, and I was invited over by him to criticize his technic.

In evident discomfort, operating in a small amphitheatre in a dense cloud of spray from several atomizers, he removed through a small opening a large unadherent ovarian cystoma. The operation was easy and without complication. Afterward he asked my criticism, to which I replied: "Do you desire it complimentary, or of a scientific character?" To which he seriously answered, "he hoped I would believe the latter," when I called his attention to the fact that in the midst of the operation he had picked up an unsterilized towel, vigorously rubbed his hands and face and immediately continued the operation. It was unrecognized that the surgeon's worst enemy lay not in the aerial hosts, by which we are constantly surrounded, but rather in the bacteria, especially the micrococcus pyogenes albus the ever-present enemy, harnessed in servitude on the skin of every living individual. A sad sequel of the case was an infective peritonitis which caused the patient's death. Dr. Thomas, beside his manifold duties and honors

in New York, as one of the first teachers in America, was an active member of the American Medical Association and one of its vice-presidents.

Very naturally the younger members of the surgical profession were among the first to accept and profit by the new faith. They studied carefully every detail of technic and practised it with the exactitude of a church ritual service. Each and every detail was subject to most careful study and the medical journals of the period are filled with contributions dealing with every phase of wound infection.

I soon determined in my study of wound repair that an aseptic wound made in well vitalized structures not alone did not require drainage, but was positively injured by it. That the effused aseptic fluids of a wound in themselves possessed a degree of vitality of considerable resistant power and that when the quantity was small it rendered a positive service, which, for emphasis, I designated, "the first aid to the wounded." Having determined this by a long series of studies upon the lower animals, I thought I saw clearly the benefit from a careful coaptation of like structures, by buried continuous absorbable sutures. These, properly applied, eliminate all danger from hemorrhage and minimize the effusion of blood and serum. Catgut for many reasons is a dangerous and unsatisfactory suture material, and I made a careful investigation of the tendonous structures of a great number and variety of animals. These studies resulted in the selection of the tendons in the tail of the kangaroo, which furnished by far the most satisfactory suture material.

There now remained only the skin for accurate coaptation, which is easily done by a very fine continuous buried suture, and the protection from infection by a seal of iodoform collodion. So far these are the lowest terms of reduction of wound coaptation and aseptic protection. For a long period I so equipped my surgery that the wounds could be under constant irrigation, and one enthusiastic rival actually operated in rubber boots, so freely did he flood the surgery. I then for a long time used oxygen gas, flowing constantly over the wound, which by its increased specific gravity displaced the surrounding atmosphere.

Then I constructed an apparatus for filtering the air, which was gently forced in a stream over the operating field.

Learning at last that all these measures were in a high degree superfluous, the attention of the profession was turned to the disinfection of the hand of the surgeon and his assistants.

Most of us in daily operative work suffered more or less severely from the various chemical applications made for this purpose. We still have painful remembrances of the permanganate of potash and oxalic acid solutions and other equally troublesome chemical preparations. Then came the silk glove constantly soaked in corrosive sublimate. Lastly to be supplanted by the rubber glove, so far the best and most satisfactory for hand protection. The demonstration was complete that an aseptic wound in well vitalized structures maintained aseptic is followed by primary union.

The surgeons of the future will improve in like measure upon the procedures of the present, but the making and maintaining of an aseptic wound must ever be based upon the fundamental principles, resulting in the saving of thousands of lives, enunciated by the late immortal scientist, Lord Lister!

THE MICROCOCCUS CATARRHALIS AS A CAUSE OF INFLAMMATION IN THE GENITO-URINARY TRACT.*

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Of the micro-organisms found in the genito-urinary tract only the two Gram negative diplococci will be considered in this paper—the gonococcus and its twin, the micrococcus catarrhalis. The meningococcus, an organism morphologically simulating the gonoccocus and the micrococcus catarrhalis in every respect, has never been reported as present in the urethra, and for the time being it may be disregarded. The meningococcus, however, like the micrococcus catarrhalis, has often been demonstrated in the nose and pharynx, and the gonococcus has been found as a cause of inflammation in practically all the various mucous membranes of the body. It is quite natural to suppose that later we shall be able to demonstrate the meningococcus in pus from the urethra, further complicating the bacteriology of urethritis.

We have, then, two Gram negative diplococci, morphologically indistinguishable, capable of producing urethritis, and differentiable one from the other only by cultural tests. And yet in only one of the text-books on genito-urinary surgery, which I have consulted, is the micrococcus catarrhalis mentioned, and in this only a small space is allotted to it.

It is my purpose to show that the micrococcus catarrhalis, first, is capable of causing an urethritis

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of more or less severity; second, that if it is not recognized early and treated properly, it is a dangerous infection; third, that if it is handled with proper respect it is of slight pathogenicity; fourth, that an urethritis caused by the micrococcus catarrhalis presents an entirely different clinical picture from that of an acute gonococcic infection; and, fifth, that it may cause serious inflammation of the internal genitals of the female.

Everyone is well acquainted with the clinical picture of acute gonococcic urethritis. A purulent discharge, swollen and everted meatus lips, and urine containing a heavy sediment of pus, make a diagnosis of specific urethritis almost sure even without the microscope showing Gram negative diplococci in the pus cells. When, however, there is no swelling and eversion of the lips of the meatus, even if Gram negative diplococci are found in the pus cells, diagnosis is not so easy. The urethritis may be due to the micrococcus catarrhalis and not to the gonococcus.

For years genito-urinary surgeons have wondered at the extraordinary clinical course of certain of their cases of urethritis—cases apparently mild at first, having in the urethral discharge a diplococcus corresponding morphologically to the gonococcus, and yet when treated as a specific urethritis failing utterly to respond. Such cases hang on indefinitely, unless the surgeon allows them to get well by practically no treatment. In the hurry of office work a smear from the meatus is taken and subjected to the Gram differential stain. Intracellular Gram negative diplococci are reported and the case goes down in the history as one of true gonorrhea. Should the patient state that he has not had recent intercourse, the surgeon smiles and thinks he is lying. Treatment is begun and the more it is pushed the worse the patient becomes if it be a micrococcus catarrhalis infection. The diagnosis is not questioned, but the failure is ascribed to "virulency of infection" or "poor physical condition," or perhaps the newer silver salts come in for a share of the blame.

In looking over the literature one finds that very many of the text-books do not mention the micrococcus catarrhalis. It is only in the later books on bacteriology that we find it described and even in these not much space is devoted to it.

Watson & Cunningham, Genito-urinary Diseases. "* * * In the writers' belief, there may be another diplococcus which has not as yet been differentiated from the gonococcus, and which is capable of creating an acute urethritis, differing from the gonorrhea in its clinical course, and which has not as yet been subjected to a test by which it can be distinguished from the gonococcus."

Keyes, Diseases of the Genito-urinary Organs. "Happily none of these organisms (Gram negative diplococci), except the micrococcus catarrhalis, have been identified in the genito-urinary tract. None of them, except the m. catarrhalis, is believed to cause urethritis. The urethritis caused by the m. catarrhalis, is probably insignificant and not to be clinically mistaken for acute gonorrhea. For clinical laboratory diagnosis of acute genital gonorrhea it is, therefore, only necessary to identify a Gram negative, intracellular diplococcus."

Mallory & Wright, Pathological Technic. "*Micrococcus catarrhalis.* This micrococcus * * * cannot be distinguished in its morphology and staining reactions from the gonococcus or from the diplococcus intracellularis meningitides."

Wood, Chemical and Microscopic Diagnosis. "*Gonorrheal pus.* In other words, if a preparation is stained as above, and small biscuit or coffee-berry-shaped cocci are seen in the pus cells and are stained with the secondary stain—that is, the Bismarck brown or carbol-fuchsin—the probability is that they are gonococci. * * * The only exception to this rule is the micrococcus catarrhalis, which, however, is rarely found in the urethra and does not give rise to an acute urethritis clinically, but to a chronic or subacute process, which does not resemble the gonorrheal infection. Absolute distinction between the two forms of organisms can be made only by cultural methods."

Hiss & Zinsser, A Text-Book of Bacteriology. "Micrococcus catarrhalis is a diplococcus described first by R. Pfeiffer, who found it in the sputum of patients suffering from the catarrhal inflammation of the upper respiratory tract. It was subsequently carefully studied by Ghon and H. Pfeiffer. According to these authors the pathogenic significance of the micrococcus is slight, though occasionally it may be regarded as the causative factor in catarrhal inflammations. Its chief claim to attention, however, lies in its similarity to the meningococcus and the gonococcus, from neither of which can it be distinguished morphologically. It is decolorized by Gram's stain, appears often in the diplococcus form, and has a tendency, in exudates, to be located intracellularly. Not unlike the two micro-organisms mentioned, too, it shows but slight pathogenicity for animals.

"Differentiation from the gonococcus is extremely simple in that micrococcus catarrhalis grows easily on simple culture media and shows none of the fastidious requirements of the gonococcus."

Libman & Celler, Reports of Mount Sinai Hosital, 1903. *The Cultural Characteristics, Etc., of the Micrococcus Catarrhalis.* " * * * Almost identical morphologically with the meningococcus, but differing from it culturally, is an organism found in normal and in some pathological conditions on mucous membranes of the respiratory tract, in the eye, the ear, and occasionally in the urethra. This is the micrococcus catarrhalis of Pfeiffer.

"In spreads this organism appears also as a diplococcus, with some flattening of the adjacent sides of the individual cocci. It decolorizes with Gram's solution. There is no capsule. In all its characteristics it bears so close a resemblance to the gonococcus that it can be differentiated therefrom under the microscope only with great difficulty.

"Points of Difference.—The tetrads formed by the meningococcus, as well as the large forms already mentioned, will sometimes, however, serve to differentiate this from the other two organisms. Further, the individuals of the micrococcus catarrhalis are more nearly oval than those of either the gonococcus or meningococcus.

"On agar the micrococcus catarrhalis grows profusely—herein differing from both the meningococcus and gonococcus—they show no growth or slight on this medium."

Park & Williams, Pathogenic Bacteria and Protozoa. *"Micrococcus catarrhalis.* Micrococci somewhat resembling meningococci are found in the mucous membranes of the respiratory tract. At times they excite catarrhal inflammation of the mucous membranes and pneumonia. These at present are included under the designation of micrococcus catarrhalis.

"They usually occur in pairs, sometimes in fours; never in chains. The cocci are coffee-bean in shape and slightly larger than the gonococcus, and are negative to Gram stain.

"They grow between 20° and 40° C., best at 37° C., and less rapidly at somewhat lower temperatures, developing on ordinary nutrient agar as grayish-white or yellowish-white, circular colonies of the size of the meningococci. The borders of the colonies are irregular and abrupt as though gouged out. They have a mortar-like consistency. On serum-agar media the growth is much more luxurient. Gelatin is not liquefied. Bouillon is clouded, often with the development of a pedicle. Milk is not coagulated, but dextrose serum media may be. Gas is not produced.

"Location of Organisms.—In the secretions of normal mucous membranes they are occasionally present. In certain diseased conditions of the mucous membranes they may be abundant.

"Pathogenic Effect on Animals.—For white mice, guinea pigs and rabbits some cultures are as pathogenic as meningococci, while others are less so."

Under the chapter on gonorrhea we find: "It (Gram's stain) serves, however, to distinguish this micrococcus (the gonococcus) from the common pyogenic cocci, which retain their color when treated in the same way, and in the male urethra it is practically certain, as no organism has been found in that location which in morphology and staining is identical with the gonococcus."

Again. "In view of the fact that several non-gonorrheal forms of urethritis occasionally exist, and also that micrococci morphologically similar to the gonococcus Neisser are at times found in the vulvo-vaginal tract of adults, it becomes a matter of importance to be able to detect gonococci when present, and to differentiate these from non-specific organisms. * * * It should also be remembered that the gonococci are decolorized by Gram's method, while other similar micrococci which occur in the urethra are, as a rule at least, not so decolorized. Organisms having these characteristics can for all practical purposes be considered as certainly gonococci, if obtained from the urethra. From the vulvo-vaginal tract the certainty is not so great, since other diplococci are occasionally found in gonorrheal pus from this area, and very rarely, also, from the urethra, which stain as gonococci; here cultures should also be made."

In the foregoing abstracts from different authors —and many of the writers on bacteriology either do not mention the micrococcus catarrhalis or devote only a few lines to it—we find a decided difference of opinion not only as to its morphology, but also as to its pathogenicity. Some believe it to be larger than the gonococcus, others that it is less flattened, and still others maintain that it cannot be distinguished microscopically from the gonococcus or meningococcus. The majority say it is of slight pathogenicity, while one says it may cause pneumonia. All who speak of its being found in the urethra agree that there it causes only a mild inflammation. To this I subscribe. But if a micrococcus catarrhalis urethritis is treated locally by the newer silver salts a severe and extensive inflammation may be set up.

In 1895 Dr. R. J. Wilson was making a study of the growth of gonococci on various media, and I supplied him with material from my clinic at Bellevue. One of the patients presenting himself for

treatment stated he had had intercourse with no one except his wife in over five years. He had a moderately profuse discharge and Dr. Wilson took some of the pus for examination, though I pronounced it a case of simple urethritis on the clinical appearance and history. Dr. Wilson reported two days later that it was a true case of gonorrhea, but for some reason did not show the characteristic growth on the medium. An examination of the smear had shown typical gonococci—Gram negative, intracellular. I had given the patient Mist. Lafayette, and on his second visit saw no reason to change. He was entirely cured in one week and had had no local treatment. I feel confident the case was one of micrococcus catarrhalis infection, though it was not recognized at the time. Several similar cases convinced me that the microscope could not be relied upon to make a positive diagnosis of gonorrhea.

CASE I. Mr. M., age 40; had had two attacks of urethritis, both of which were probably gonorrhea and required considerable time to cure. I saw him for the first time in 1905, four months after his second urethritis began. Gram-negative diplococci were present in the urethral discharge and the diagnosis of chronic gonorrhea was probably correct. In May, 1910, he consulted me because of a slight frequency of urination and burning at the head of the penis. These symptoms began three days after connection but there was no discharge, and scrapings from just within the meatus failed to show any Gram-negative diplococci. His urine contained a few mucous strings, but no free pus. The prostate was somewhat congested. I gave him a deep instillation of protargol and told him to report in two days. Business compelled him to leave the city and I did not see him for six weeks. During this period he had been free of all symptoms pointing to the urinary tract until the morning of his call when he had found a discharge at the meatus. He stated he had not had intercourse in over six weeks.

Examination showed a normal meatus with the exception of a moderately profuse discharge. The smear showed a very large number of Gram-negative diplococci, mostly within the pus cells—as perfect a picture of gonococci as one would wish to see. Believing this to be a case of gonorrhea, I gave an anterior injection of argyrol, 10 per cent. To my surprise the patient became rapidly worse and within two weeks had developed epididymitis, prostatitis, seminal vesiculitis and pyelitis with a temperature running as high as 103° F. Nothing locally or internally benefited him in the least until urotropin, 15 grains 6 i. d., was given and then all symptoms began to subside. One week after urotropin was begun the patient's urine was nearly clear. There was no discharge and only a slight induration of the right epididymus remained. A few washes of a very mild astringent cleared the urine entirely of pus.

That this patient had no idiosyncrasy for argyrol was proven when it had been used successfully on one of the previous attacks of urethritis. It is to be regretted that no culture was taken, but from the clinical course of the disease and from the microscopic findings in smears taken two or three weeks after the onset, I feel confident this was not a case of gonococcic infection, but one of micrococcus catarrhalis. The history is given to show the necessity of an early diagnosis and proper treatment.

CASE 2. Mr. S. was under my care some years ago for chronic urethritis and was entirely cured. From the day of his discharge until March 2, 1911, he had had no urinary trouble whatever. He had often examined his urine and always found it perfectly clear. On February 27 he had met a former mistress and had over-indulged sexually—having intercourse five times during the night. On the fifth attempt erection was decidedly forced. Three days later he found a discharge from the urethra and immediately came to the office. The meatus was perfectly normal except for a mucopurulent discharge. His urine contained a very small amount of pus in comparison to the discharge. A smear from the meatus showed very many Gram-negative diplococci, mostly within the pus cells. A diagnosis of simple, or micrococcus catarrhalis urethritis was made and the patient was given capsules of stearosan. A culture from the meatus was taken and two days later showed typical growth of micrococcus catarrhalis. On March 4 there was no discharge, but scrapings from just within the meatus showed Gram-negative diplococci. On March 9 the urine was microscopically free of pus and no bacteria could be found in scrapings from the urethra. The patient has been perfectly well ever since.

CASE 3. Dr. M., age 50 had never had venereal disease. Early in May, 1910, his urethra was badly traumatized, the principal injury being in the prostatic portion. From that time until July, 1911, he had considerable pain, especially after defecation, probably due to chronic prostatitis. At times he found a mucous discharge at the meatus—most pronounced after a hard movement of the bowels. In July he found his discharge had become purulent and quite profuse. This followed and was perhaps caused by excessive use of his automobile, his work compelling him to be in his machine almost constantly for over a week. As he had had no sexual intercourse for over a year—erections being decidedly painful—he thought he had a simple urethritis and began taking large doses of oil of santal. As this did not check his discharge he came to the conclusion he must have infected himself by his hands as he had had a heavy run of gonorrheal vaginitis and salpingitis just previously. He came to the office on the fifth day of his discharge.

I found a moderately heavy, purulent discharge; meatus not swollen and lips not everted; and, considering the amount of discharge and duration of urethritis, an exceedingly small amount of pus in his urine. Under the microscope very many

Gram-negative diplococci, almost entirely intracellular, were found. These to the eye were gonococci, but a diagnosis of micrococcus catarrhalis was made and a culture on agar taken. Dr. Higgins took a culture on glucose agar. The growth on agar at room temperature was typically that of micrococcus catarrhalis and Dr. Higgins reported on the culture "nothing resembling the gonococcus found."

The course of the disease showed conclusively that the diagnosis was correct. As the patient had been taking oil of santal for five days without much benefit he unquestionably required local treatment to aid, and his urethra was washed with a very mild astringent. The following morning, partly because the diagnosis was not yet certain and partly because I wished to verify my opinion in regard to the newer silver salts in such cases, I filled his urethra with freshly dissolved argyrol, 10 per cent., and held it there for fifteen minutes. In the afternoon his discharge was decidedly increased and there was much more pus in his urine. I therefore washed his urethra with my astringent again. The following morning the flareup caused by the argyrol had subsided and the astringent wash was used. After this the urethritis subsided quite rapidly and on the tenth day no discharge could be found, but massage of the prostate brought away considerable pus. Examination of this showed an occasional diplococcus. Three weeks from the time of his first visit his urine was microscopically free of pus and there was no pus to be found in his prostatic secretions. In addition, all his old prostatic pains had disappeared. He was kept under observation two weeks and then discharged as cured. I have seen the patient a number of times since and can find nothing wrong with him.

CASE 4. W. C., age 28, came to the office September 22, 1911. His first attack of urethritis began early in March of this year. His discharge ceased after four months treatment and he was pronounced cured. On September 1 he noticed a discharge from the meatus which he could not understand, as he had not had intercourse in thirty days and had drank no alcohol. He immediately consulted his physician, who pronounced it gonorrhea on the microscopical findings. Treatment was begun by local injections and internal medication, but his discharge steadily increased in severity and he was referred to me. The only symptom he complained of was the discharge. I found a profuse, thin, purulent discharge; and the meatus considerably swollen. A smear was found to contain immense colonies of Gram-negative diplococci and in a few of the pus cells a fairly large number of the same organism, but the cells were not crowded with germs as is so often the case in gonorrhea. The urine contained a very large amount of pus in all three specimens; the prostate was normal to touch, but the right vesicle was considerably enlarged. Though the clinical evidence indicated a true gonorrhea, a diagnosis of micrococcus catarrhalis infection was made on the microscopic picture. He was given capsules of stearosan. A culture on nutrient agar, taken before he had passed water, showed at the end of 48 hours a typical growth of micrococcus catarrhalis.

On September 25 there was little discharge, but both vesicles were enlarged.

On October 9 there was no discharge, but the urine contained a very large amount of pus and the left epididymis was swollen. A deep injection of fluoride of silver was given.

On October 14 there was no discharge and the urine to the eye was free of pus. The swelling in the scrotum was connected with the globus minor—the globus major not at all involved—and was about an inch and a half in diameter. The skin of the scrotum was adherent to it. The left vesicle was as large as a man's thumb.

On October 28 the testicle was nearly normal in size; there was a moderately heavy discharge and considerable pus in the urine. Massage brought away a very large amount of pus from the vesicles.

On November 3 by stripping the urethra a small drop of pus appeared at the meatus. When this was stained a typical picture of gonococci was seen. The slide was taken to Dr. Sondern, who pronounced it to be gonorrhea.

On November 8 there was no discharge, but scrapings of the urethra showed a few Gram-negative diplococci. A culture on blood agar and nutrient agar was taken from the urethra; from the fluid which appeared at the meatus on massage of the prostrate; and from the sediment in the urine passed after massage. These tubes were sent to Dr. Sondern. His report is:

"Smear Nutrient Agar: No growth.

"Smear Blood Agar: 7 Col. Catarrhalis 8 Col. Coli.

"Masage Nutrient Agar: No growth.

"Massage Blood Agar: 10 Col. Catarrhalis 10 Col. Coli.

"Mass. Centrifuge Nutrient Agar: 11 Col. Catarrhalis 5 Col. Coli.

Mass. Centrifuge Blood Agar: 10 Col. Catarrhalis 5 Co. Coli."

From these two reports is seen that it is impossible to make an absolutely positive diagnosis of gonorrhea by the microscope.

CASE 5. Miss M. This case came under my observation through the courtesy of Dr. E. W. Lee. Dr. Lee removed her appendix early in April and at that time found her internal genitals perfectly normal. In July Dr. Lee was again called to see her and found she had a large tumor on the lower left side and a temperature of 103°. The abdomen was again opened and a large pus tube, with exceedingly thin walls, was discovered on the left side. This was unfortunately ruptured in removal. No culture was taken from the pus, but an examination of a smear failed to disclose any germs, perhaps because the smear was taken 36 hours after operation. A peritonitis developed, the wound was opened and a very large amount of pus was evacuated. The wound continued to

discharge pus and none of the various antiseptics used to flush the cavity had any influence in checking it. Dr. Lee brought me a smear of the discharge and I found a moderate number of Gram-negative diplococci—intracellular and extracellular. I suggested a culture. Micrococcus catarrhalis in pure culture were found. Cessation of all local treatment was immediately followed by slow but steady improvement, and one month after the cause of inflammation had been found the abdominal wound was closed. It has been my privilege to see the patient several times since, and I can say there is no evidence of any local trouble whatever.

For the following history I am indebted to the courtesy of Dr. D. J. Brown, of Springfield, Mass., who was in my office while I was examining some of the smears of Dr. Lee's case.

CASE 6. Miss B. Age 17. Family and personal history negative. Menstruation began at the age of 15 and has been regular and of normal amount. On June 28, while at a dance, perspired freely and was exposed to draughts. The following morning she noticed pains in the right iliac region. On August 27 she entered Mercy Hospital. At the time of her admission her temperature was 101°, pulse 120, respiration 25, and there was rigidity and tenderness over both sides of the lower portion of the abdomen. Hymen intact and vaginal opening too small to permit examination. A rectal examination revealed a mass on both sides and fluctuation posteriorly. On August 28 a double pyosalpingotomy was performed by Dr. Mahoney, and drainage established. The sinus discharged profusely in spite of local antiseptics. On September 22 the discharge was still so profuse that a second operation was performed for the purpose of facilitating more drainage. Still, under treatment, the discharge increased. When Dr. Brown came on duty on October 18 he suspected the cause of inflammation and took a culture of the pus. I found micrococcus catarrhalis, staphylococcus and Gram negative bacillus. The tube was sent to Dr. Sondern, who corroborated the findings.

The sinuses have not closed at present, though there is somewhat less discharge than when it was being washed regularly.

On account of the well-known, far-reaching effects of gonococcic urethritis, it was my custom to regard all cases of inflammation of the urethra showing Gram negative diplococci in the pus cells, as true gonorrhea, and to treat such cases until all shreds and even microscopic pus had been cleared from the urine. And not only that, the prostatic secretions must be free of pus before the patient was discharged as cured. I felt sure I was treating many cases of non-specific urethritis, but knew of no simple means of distinguishing one from the other. I tried a number of new and original methods of staining without being able to find anything better than those used at present. The elaborate technic employed by the laboratories for determining by culture the presence of gonococci was altogether too long and required too much apparatus for the busy practitioner. I finally realized that it was not necessary for clinical purposes to prove that the gonoçoccus was absent, but it was sufficient to show that some other Gram negative diplococcus was present, it being generally admitted that during the early stages of gonorrhea it is practically impossible to find any other germ than the gonococcus in an urethral discharge. Even in the later stages I have failed to find the gonococcus when the micrococcus catarrhalis was present. In looking over the literature on bacteriology, I could find no evidence that the meningococcus had ever been found in the urinary tract, but several authors reported the micrococcus catarrhalis as occasionally found there. I also found that the micrococcus catarrhalis would grow on nutrient agar at room temperature, while neither of the others would. Here was a very simple and easy method of making a differential diagnosis, the only objection being the time required. But that cannot be avoided.

Although absolute differentiation between a gonococcic urethritis and one due to the micrococcus catarrhalis is only possible by culture, the clinical picture will help considerably. An urethritis, seen in the early stages, presenting a meatus with swollen and everted lips, a creamy discharge, a large amount of pus in the first specimen of urine and Gram negative diplococci crowding the pus cells is unquestionably a true gonorrhea, and, for clinical purposes, no culture need be taken. But a recent urethritis presenting a meatus which is not changed in appearance, a moderate to slight amount of discharge, not very much pus in the first urine and Gram negative diplococci in the pus cells, may be a true gonorrhea, or it may be an urethritis, due to the micrococcus catarrhalis. If the case is seen for the first time after the discharge has persisted for some weeks, the clinical picture of gonorrhea does not differ from that of an urethritis, due to the micrococcus catarrhalis.

At times the microscopic picture of the micrococcus catarrhalis enables one to make a diagnosis of that infection. A typical smear contains immense numbers of Gram negative diplococci in colonies independent of the pus, and the pus cells are not crowded with germs, as is the case in typical gonorrhea. When such a specimen is found a probable diagnosis of micrococcus catarrhalis infection may be made. The microscopic picture varies from day to day, sometimes showing a perfectly characteristic

field and sometimes so closely resembling a gonococcic picture that it is impossible to say from its appearance which germ is present. It must be borne in mind that in the very earliest stages of gonococcic urethritis we find more gonococci outside than inside the pus cells. Gram negative diplococci entirely within the pus cells point strongly to gonococci, but may be the micrococcus catarrhalis. It is said that the micrococcus catarrhalis is more rounded than is the gonococcus. I have found such to be the case usually, but in many specimens studied I have seen as true coffee-bean-shaped cocci as one would expect to find in true gonorrhea.

If we find Gram negative diplococci in the pus cells and culture on nutrient agar shows the typical growth of micrococcus catarrhalis, we may be sure gonococci are absent, and under the same conditions, if we get no growth on utrient agar, we are certain the germs in the pus are gonococci. But this is not sufficient from a medico-legal standpoint. Microscopic examination of the growth on nutrient agar is necessary in all cases. A culture from a gonorrhea of a few weeks' duration will often show a growth closely resembling that of the micrococcus catarrhalis, but under the microscope it will be found to be a Gram positive diplococcus, staphylococcus, or perhaps a bacillus. Also the microscopic examination must be made as soon as the growth shows on the agar, because an old culture of micrococcus catarrhalis changes from Gram negative to Gram positive.

In just what proportion of cases of Gram negative diplococcus infection of the urethra the micrococcus catarrhalis is the cause of inflammation I am not at present prepared to state. During this year I have seen five cases at my office. Of the first eighteen cases of acute urethritis tested at the Post-Graduate Dispensary by Dr. Caples, fifteen contained Gram negative diplococci, and of these one proved to be a micrococcus catarrhalis infection.

From the history of some of my cases the disease seems to be directly communicated by copulation, the patient admitting having had intercourse three to five days before the discharge began. In other cases too much time had elapsed between venery and the appearance of discharge to think the trouble could possibly be due to direct infection, the time of continence being respectively fifteen months, nine months, seven and four weeks. In Dr. Lee's case there is little doubt that there had been no intercourse between the time of appendicectomy and the development of the abscess. In Dr. Brown's case, the patient, as far as could be determined by physical examination, had never had intercourse, and there was no history of vaginal discharge. The pneumococcus may infect and excite disease in many tissues of the body independent of any preliminary localization in the lungs (Park & Williams), and it is quite probable that the micrococcus catarrhalis is capable of doing the same. In this way is explained infection in Cases I., III., IV., V. and VI.

The disease has a tendency to complete recovery if left alone, and quick recovery if blennorrhagics are administered. But if active local treatment is employed, inflammation is exaggerated. Under proper care the patient is well in from one to three weeks.

In regard to treatment I have little to say at present. Not enough cases have been observed to warrant taking up the subject. As a general proposition it is wise to do as little locally as possible, and above all to avoid the newer silver salts in the strengths usually employed in gonorrhea. Protargol should not be used stronger than 1:1000, argyrol not stronger than 1:200, and I prefer to avoid them altogether. In the majority of cases some preparation of santal oil in fairly large doses is sufficient to effect a cure in a few days, but if a discharge still persists after a week, some local treatment must be employed. I have found silver nitrate, not stronger than 1:32,000, more efficacious than anything else I have tried. If complications occur all local treatment must at once stop and urotropin be given in large doses.

Cases V. and VI. are really interpolations in a paper devoted principally to the micrococcus catarrhalis in the male urethra. They are presented as examples of the virulency of what has been supposed to be a micro-organism of slight pathogenicity. As far as I know the cases are unique.

Everyone will see at once the immense importance from a medico-legal standpoint of recognizing the fact that there are two entirely different micro-organisms, morphologically alike, capable of causing inflammation in the genito-urinary tract.

IN CONCLUSION.

1. Demonstration of a Gram negative diplococcus within the pus cells of a discharge from the urethra is not proof positive of a gonococcic infection.

2. The fact that a man has an urethritis which shows Gram negative diplococci crowding the pus cells is not proof positive of recent exposure to gonorrhea by copulation.

3. Not only is a microscopic examination necessary in all cases of urethritis, but in a certain proportion a culture test is imperative.

4. All cases of urethritis beginning as a subacute inflammation should be regarded with suspicion.

5. Just because an urethritis is very mild at the start it should not be classed as a micrococcus catarrhalis infection until it has been proven so by culture—gonorrhea is too serious a disease to be excluded without thorough investigation.

6. The micrococcus catarrhalis is not a germ of slight pathogenicity, but is capable of causing serious and even dangerous inflammation.

616 MADISON AVENUE.

MISLEADING ABDOMINAL SYMPTOMS.

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The great discrepancy often existing between our pre-operative diagnosis and the actual findings at operation, has encouraged me to report a few cases, based on a study of the painful abdominal reflexes. These errors are not dependent on the personal equation of each surgeon—although this has much influence—but are especially due to the unsatisfactory estate of our knowledge in regard to them.

It has justly been said by many high authorities that abdominal surgery has in store many surprises for the surgeon and that it can never be predicted with any degree of scientific certainty what actual pathologic condition will be found until the abdomen is opened. Of course, it can be urged that a modern abdominal section implies very little risk to the patient and that exploratory laparotomy settles all doubts, but there are many people who object to this procedure; moreover, it does not encourage clinical diagnosis. Since Lennander published his masterly paper in 1901 it has been a controverted point whether the peritoneum and the abdominal viscera are sensitive. He called attention to the marked contrast existing between parietal and visceral peritoneum, basing his argument on many observations during operations performed under local anesthesia, and he established that the visceral peritoneum is insensitive to pain, but not to cold or heat, and that the abdominal viscera possesses no sense of pain. He believed that painful abdominal sensations are transmitted only by those nerves which supply the parietal peritoneum, the phrenic, the lower six intercostals, the lumbar and sacral nerves. He maintained that the pain never originates in the abdominal viscera themselves, but that painful sensations extend to sensitive tissue outside of these organs. This opinion is admitted by many, disputed by others.

Let us take for instance that painful spot of McBurney's as an indication of appendicitis. Many have been the appendices sacrificed to this sign, and innumerable the deceptions. Since McBurney described it in 1889, this painful point has been erroneously recognized as a pathognomonic sign. Its value is less than what is generally admitted, although most of us have been led by it. In my work it has been found absent in one-third of the cases, and at other times present when there were no changes, either macro- or microscopically in the appendix.

I saw in consultation with Dr. H. Grad and operated on a lady who was taken sick with pains in the right iliac fossa with marked tenderness on pressure and rigidity of the right rectus muscle. History of previous attacks of what was designated as appendicitis by two able physicians. Menstruation appeared one week sooner than was expected. She had been sterile. I made the diagnosis of ectopic pregnancy, although the case presented all the characteristics of appendicitis. At operation next day we found the abdomen full of blood, due to the bursting of the gestation sac on the left side, and a fetus a few weeks old. The pain had been transferred from the left side to the right, constituting a typical case of those paradoxical pains occasionally observed in ectopic pregnancy. I was led to the diagnosis of ectopic pregnancy by the paroxismal attacks of pain complained of by the patient, and by the characteristic Hunterian elevations of the aureola of the nipple. The appendix was found to be very small and in complete involution.

Following is a case illustrating that absence of tenderness over McBurney's point does not negative the existence of some serious inflammatory condition in or around the appendix. Recently I operated at the French Hospital upon a man of twenty-seven for a supposed chronic appendicitis. The diagnosis was based on a history of previous attacks, dating back six months, persistent indigestion and pain of a vague nature. There was hardly any tenderness on deep pressure over McBurney's point. The internes, Doctors Shanley, Lavandera and Vina, who studied the case with me, corroborated the diagnosis. At the operation, which we thought to be an internal one, it was found on incising the peritoneum that a turbid serum exuded, the appendix was normal and the cecum inflamed. Appendix removed and drainage employed, the cure was rapid and complete. Suspecting the condition to be of a tuberculous origin, the patient was vaccinated with von Pirquet vaccine with negative results.

This case taught us that typhilitis is more common than is generally admitted. Kelly, of Baltimore, found it in fourteen cases. Inflammations of the cecum may occur independently of inflammation of the appendix, or of any other lesion of the intestinal tract, such as tuberculosis, actinomycosis and cancer. The etiology is generally obscure, and coprostasis may be its origin. These

inflammations may terminate in ulcerations or perforations of the cecum, forming a perityphlitic abscess, as I had occasion to observe in a man who came from Santo Domingo, and who also was seen by my friend, Dr. Mañon, of that Republic. This patient had had an abscess presenting in the lumbar region, simulating a perinephritic abscess, which was opened before he came North, a sinus resulting, from which he was relieved here.

F. S., age 35, had suffered from attacks of severe colics and "indigestion," with occasional vomiting. McBurney's point could well be elicited as well as tenderness in the right hypochondrium. He had consulted several physicians who diagnosticated a cholecystitis or cholangitis, and operation was advised. I concurred in the diagnosis adding the possibility of an appendicitis. At operation (French Hospital) we found his gall-bladder normal, the appendix like a thin cord in process of retrogration, with its mucous membrane destroyed, and a floating kidney. The ectopic kidney was the sole cause of his troubles, the attacks of pain and stomach distress were Dietls crises.

The existence of the ectopic kidney was not suspected before the operation.

Our knowledge of the sensorial manifestation of diseases of the abdominal viscera is still incomplete, and these manifestations are often perplexing. We ought never to overlook the fact that the abdominal organs lack the direct sensation of pain, and that those pains which accompany any visceral disturbances are located in the abdominal parietis, often reflected from the initial irritation. These misleading abdominal reflexes may be divided into two categories, remembering that there is a difference which obtains between the pain complained of spontaneously by the patient and that which is produced by the examining hand.

The abdominal reflexes have a marked similarity to those reflexes which affect other organs, such as the pain referred to the knee in morbus coxarius, the well-known reflexes from ovarian and uterine disturbances, the hemicrania from defective ocular refraction and those not so well known arising from urethral strictures, which are felt at the knee and lumbar region especially when the stricture is located in the meatus. It is remarkable with what uniformity these sympathetic reflex pains follow certain routes, generally on one side, suggesting, as Van Criergern says, an anatomical base, as the branches of the sympathetic nerve accompany the arteries in all their ramifications. The difference between the pains of intestinal colic or ileus and those of solid viscera seems to be in the greater motility of the intestines, and in that they are composed of muscular fibers, causing, as Lennander remarked, a tugging at the mesenteric attachment, or prolonged muscular contraction. When a muscular organ contracts for a time the sensation becomes painful.

There is also, however, the possibility that compression of the sympathetic fibers in the solid viscera may cause pain, or that they may partake of the congestion or inflammatory process which affect all the histologic elements of the organ, becoming irritated through proximity.

Pain is a danger signal, evolved for the protection of the individual, and is naturaly referred to the cutaneous system, where the organism has learned to locate the source of danger. It is, therefore, where most of the painful sensations occur. McKenzie and Head have described certain zones, which correspond to a cutaneous termination of a pain-conducting fiber, having its origin from that cord segment involved by the irritated viscus. It is evident that the abdominal plexus, the celiac, suprarenal, renal, phrenic, superior mesenteric, aortic and spermatic plexus, manifest painful activity when they are irritated at their termination. When irritation exists pressure on the ganglia causes pain. If the irritation is at the root of the nerve, in the spinal cord, there is a resulting pain, as in tabes dorsalis, spondylitis deformans and tumors of the spinal cord, often transmitted to a cutaneous terminal or other distant organ. These neuralgias when of central origin are generally distinguished by their bilateral character.

Robert T. Morris in 1908 essayed to establish the importance of painful points, which when located only to the right side indicated irritation of the appendix, and when located on both sides indicated irritation of pelvic origin. Unfortunately this has not been confirmed.

Toxines may be capable of irritating a nerve through their chemical action, but of this we have no evidence. These painful reflexes may be clinically divided into two forms. The acute form, which are caused by lesions of an acute nature, generally accompanied by intestinal paralysis more or less intense, often attended by constipation, vomiting and final collapse. It is found in cases of fulminating appendicitis, rupture of the intestines, perforated gastric or duodenal ulcer, in acute pyosalpinx and ruptured ectopic gestation. The symptoms indicate an internal hemorrhage, an intestinal obstruction or a peritonitis. The nature of the pain is extremely acute and at times terrific, generally located near the umbilicus, followed by colics or a remittent and exacerbating character, and accompanied by a peculiar psychical excite-

ment. The pain, although local at the beginning, soon becomes generalized over the abdomen, with maximum intensity at the initial point.

In the second, or chronic form, the onset is with symptoms of chronic indigestion, flatulence and at times vomiting, as seen in chronic appendicitis, gastric and duodenal ulcers, which are not perforated, in gallstones, cholecystitis and irritations from the pelvic organs. The most frequent causes are coprostasis, slow intestinal obstruction by foreign bodies, compression of organs by excessive hypertrophies, tumors, cancerous strictures, and bands the result of previous peritonitis. Its progress is slow and gradual. Pain or an uncomfortable sensation is what generally attracts the attention of the patient and brings him to the physician. The pain, although often vague and not sufficiently characteristic to establish a clinical entity, is nevertheless the first symptom. It is caused by a neighboring peritonitis, as it occurs in disturbances of the liver and biliary appendages. It has its maximum intensity in the epigastrium, or middle of abdomen, radiating to the back and shoulders. When the pain is referred to the right hypochrondrium, to the right shoulder and back, we naturally think of gallstones or some disturbance of the biliary apparatus. This is not always diagnostic, as I had occasion to verify in a patient on whom I operated a few months ago. He came with the diagnosis of a cholecystitis or cholangitis, made independently by two well-known clinicians. The history follows:

N. M., aged 37, had been suffering intense pain for several years, and constant indigestion, all of which incapacitated him for business. Pain was localized in the right hypochondrium and in the epigastrium, traveling towards his right shoulder. There were frequent colics. Tenderness at McBurney's point was absent, although present the year before. The symptoms all justified the above diagnosis.

He entered the hospital and was operated upon after a prolonged preparation.

At the operation I found his gall bladder perfectly normal and the stomach bound down by adhesions, cobwebs of the upper abdominal cavity, as Morris would say. The adhesions were carefully separated and a small, hard area was felt in the stomach, the result of an old old gastric ulcer, which the omentum had efficiently repaired. This adhesion was not disturbed. Nature had proven herself an excellent surgeon. The appendix showed marks of former inflammatory changes; it had two constrictions. It was amputated. The final result was highly satisfactory. The upper abdominal region is a sort of Aegean sea, where many a diagnosis is wrecked. In children especially there is often observed a formidable train of purely abdominal symptoms, which make us suspect everything, from acute appendicitis to volvulus, but the real condition—a pneumonia, whose evolution is not shown by the most careful examination of the chest. Pain in these cases is reflected by irritation of the phrenic and radiate to the abdomen.

These symptoms are not the exclusive monopoly of childhood; they are also met with in the adult. A medical friend called me in consultation to operate upon a man forty years old, who presented all the symptoms of a grave abdominal disease, probably an acute pancreatitis. He complained of severe and persistent pain in the abdomen, spreading down to the lumbar region and the end of the spine. This was followed by syncope and collapse. The Cammidge reaction was negative and there was no fecal vomiting. His general condition was so desperate that we hesitated to operate. Gradually his symptoms abated, and those of the chest manifested themselves with dyspnea, crepitation and final consolidation of lung. He recovered from his lobar pneumonia.

In diagnosis the symptom pain gives valuable information as to the disturbance of the abdominal organs, but it is by no means pathognomonic, neither by its characteristics nor by its localization. It may be present in the most trivial condition, as in a slight indigestion, and be absent in the most formidable disease.

I have observed its absence in cases of perforated appendicitis. The pain may be transferred from a distant lesion, being reflected in obedience to the law of conduction of sensations to the ending of the irritated nerve; it may be reflected from lesions in the lungs, heart or nervous system. There are rare instances of intestinal paralysis due to irritations in the central nervous system, as was first reported by the Italian clinician Semola, and I was fortunate enough to see a similar instance in the practice of a friend.

The localization of pain in the abdomen in hysterical subjects is of great interest, especially in the male, who are supposed to be less susceptible to these stigma. We might be led to operate on these persons unnecessarily. A young woman was operated upon several times by different surgeons, she having succeeded in masquerading grave abdominal symptoms. Many others suffer from imaginary appendicitis, chiefly to-day, when any cramp on the right side is synonymous with appendicitis in the layman's pathology. On the other hand, it behooves us to be on our guard so as not to equivocate ab-

dominal symptoms, attributing them to mere nervousness.

In formulating a diagnosis, a careful study of the history is imperative, so that with the aid of the symptom-complex and physical signs we may arrive at a correct judgment. And if we expect to make any progress in our knowledge of these abdominal reflexes, and their practical applications, it is of the greatest scientific utility to collect and publish all these facts, together with the intrinsic diagnostic difficulties, until the arrival of the time when all this material which we are laboriously collecting can be rationally co-ordinated. But in the meantime, in practice, we have to be prepared with philosophical resignation to be often deceived at the findings at operations.

854 LEXINGTON AVENUE.

"SURGICAL ESSENTIALS."

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ASEPTIC SUTURE MATERIAL.

There is a certain inevitable scar-formation going on in every wound during the healing of it, no matter how nicely apposed the divided tissue may be. The cicatrization is materially increased by the presence of a foreign body or the action of chemical irritants. All suture materials are foreign bodies and all antiseptic solutions are chemical irritants. The exclusion of irritant solutions is a simple matter and is practicable, but not so the abolition of the suture.

In a *wound which involves only the surface,* a skin wound for example, the actual penetration of the tissues and the lodgement of sutures in them can frequently be avoided by the use of tiny clamps of metal, Michel's clamps, or sterile zinx-oxide adhesive strips. It is thus possible, in a limited number of cases, to obviate altogether the introduction of a foreign material into the tissues. But when the *deeper* layers of a wound must be brought into apposition, the use of a suture can scarcely be circumvented.

Coaptation is needed until the newly-formed tissue has sufficient stability to retain the severed parts in position. After that, solution of continuity and absorption of the suture by the tissues which it traverses is looked for, unless the material is not absorbable, and must either continue to remain as a foreign body or else be removed by extraction. But extraction of sutures from the deeper layers is impracticable, and again it is obviously objectionable to leave sutures that cannot be absorbed.

A solution of the problem was given long ago (1817), when it occurred to Sir Astley Cooper that violin strings might also be used in surgery. Since then the preparation of aseptic absorbable sutures of catgut has been the subject of considerable study. The prime qualities of suture material, as it is required in plastic surgery, are:

(a) Sterility.
(b) Definite and measured absorbability.
(c) Fineness with adequate tensile strength.
(d) Pliability.

Even at the present day there is no vegetable fiber, animal or synthetic product which answers all these requirements quite as well as the suture prepared from catgut.

Catgut, as its name does not imply, is usually obtained from sheep's gut. After the process of preparation the serous muscular and mucous coats are lost, and there remains little more than the submucosa, consisting of a stratum of loose connective tissue with a few elastic fibers. In the main, then, the catgut of commerce consists of connective tissue. From the chemical standpoint, excluding the elastic fibers, almost its entire mass is collagen. Collagen is a substance which, with or without the aid of enzymes, furnished by polymorphonuclear leucocytes, and probably various other tissue cells, becomes hydrated, and is first converted in the water-soluble gelatine. In this form it yields more easily to enzymotic action and undergoes further digestion, apparently resolving into albumoses and peptones until it disappears completely and is absorbed.

A piece of aseptic catgut imbedded in living tissue calls forth a definite tissue-reaction, which presents two phases. In the one, the cell activity is aimed at removing the foreign body which is lodged in the tissue; in the other, the forces at work are directed towards effecting a replacement of the damaged tissue in the path of the suture. But these two phases of cell activity are revealed as well in every healing wound. There, too, the destroyed tissue undergoes katalysis and is removed, while at the same time reconstructive processes are going on.

The structural changes which take place in catgut when it is imbedded in living tissue have been followed microscopically by animal experiments. With the inhibition of water from the tissue-plasma which bathes the suture, the piece of catgut begins to swell and untwist and becomes loose in texture. The ameba-like polymorphonuclear leucocytes, which at the beginning are present in considerable numbers, find their way into the intestines of the suture, while the cells of the granulating tissue crowd closely around it. Under the influence of

the moisture and the enzymotic action of these cells the dissolution of the catgut fiber is started. At first there is what might be called a fragmentation of the catgut, and then a disappearance of the particles.

The inauguration of the whole process of catgut solution probably depends primarily on the absorption of tissue water. By subjecting the gut to the action of certain chemical substances the absorption of water can be retarded, and consequently its resistance to dissolution by the body tissues considerably increased. Thus catgut strands of more or less definite and known grades of resistance can be prepared.

To indicate the degree of resistance to absorption it has been the custom of the manufacturers, with a few exceptions, to designate the suture material by the *number of days* it requires until pronounced signs of catgut dissolution are to be seen when it is imbedded experimentally in the thigh muscle of a rabbit. Thus the term "forty-day" chromic catgut, for instance, is meant to imply that the particular strand has been treated with chromic acid to such a measure that it is able to withstand absorption in the thigh muscle of a test animal for an average period of forty days. Thereafter the rapidly disintegrating suture can no longer properly be said to have any retentive value. With these facts in mind the terms "10, 20, 30, 40, 60 or 80 day" catgut ought not to be misleading.

Moreover it is apparent that the time required for absorption in the *human muscle* need not be exactly the same as in the test animal. One's judgment as to how long a piece of catgut of given resistance shall last in the human tissues depends on a number of factors which influence the rate of absorption. Besides considering the difference between human muscle and animal muscle, it must be remembered that not only *muscle* but various other tissues are repaired by suture, and each tissue exerts its own peculiar katalytic action. The specific tissue influence upon catgut is even more detailed than this, for not only the different tissues in the same individual but also the same tissue in different individuals have this solvent power to a somewhat unequal degree. In case of suture of the skin it can sometimes be observed that even the various portions of the same suture are not always absorbed with the same rapidity. In the semilunar hypogastric incision a slight difference in absorbability may occasionally be discovered at the ends of the incision when compared with the middle portion of it, which invades the zone of the suprapubic hair follicles. When segments of the suture remain exposed, as in skin and mucous membrane repair, the amount of moisture may have much to do with premature dissolution. Wet dressings, douches, discharges, wound or gland secretions, sweating, all may help to macerate the catgut and shorten the period of its usefulness.

Clinically catgut behavior can most conveniently be studied in *surface* sutures. In order to eliminate outside factors which may complicate the observation, the wound must be kept dry. In the dry, clean wound the solution of continuity of the part of the suture which is imbedded in the tissue is indicated by the falling off of the knots on the surface. When this has happened, the continuity of the suture being broken, the material can no longer serve the purpose of holding the tissues together, and with this its serviceability ends. Thus it will be found that a piece of fine "forty-day" chromic catgut may last five to seven days, and occasionally even twelve days or more, when employed as a skin suture. The variation in the time required in similar locations may therefore be as much as one week. The same technic may have been resorted to in each instance, and still such marked latitude as this is observed for material of apparently the same resistance. Obviously the reason is to be sought in the hitherto but little studied processes of tissue digestion. In the one case the enzymotic action unfolds itself more speedily than in the other. This in turn is made possible by the presence of sufficient water in the tissue in which the suture lies imbedded. If there were besides the living cells no fluid in the intercellular spaces no cell-plasma, then the digestion of catgut in the tissues would seem quite impossible. Water is necessary in catgut digestion in the tissues just as it is requisite in the digestive processes in the alimentary canal. In both cases the action is fundamentally one of progressive hydration; water is taken up into the dissociating molecule of collagen, and finally assimilable proteoses and peptones result. So it is that catgut disappears more rapidly in the succulent derma of the young man than in the desiccated skin of the aged.

It has been observed that in the course of catgut disintegration small fragments may be taken up into the bodies of the polymorphonuclear leucocytes. It would seem likely that the same principles are valid here in *intracellular* catgut digestion that govern *extracellular* catgut digestion. The moisture supplied by the cytolymph makes it possible for the enzymes produced within these cells to exert their solvent influence.

In a measure the time of catgut absorption is also affected by the tickness of the strand. It neces-

sarily takes longer to bring about solution of continuity in a thick than it does in a fine suture. But the selection of bulky sutures is not in accord with the modern tendency towards finer technic. It is better to choose thin sutures, by which the most accurate apposition with the smallest amount of damage to the tissues is attainable. Instead of *increasing the size* to obtain the desired durability, the *chromicization of the finer strands should be increased.* It is only in order to get sufficient tensile strength that larger sizes may be introduced, but never to increase the resistance. If the material is handled with the gentleness which the delicate make-up of the tissues demand, sutures which are coarser than No. 1 or No. 2 will seldom be required in the course of major operations. In other words, the finer sutures are to be generally preferred, notwithstanding that they may have to be chemically modified in order to become sufficiently lasting. Cromicized, unlike iodized gut, is so prepared by the manufacturers that it contains no chromic acid which is not in stable chemical combination with its collagen. There is no free chromic acid or chromate in solution in the medium in which the strands are kept. However, when the chromic catgut is converted into soluble bodies it is true that the chromic acid radical must again be liberated. But this occurs at a time when the more active healing processes are ended, and the traces of the foreign chemical can no longer noticeably disturb the chemistry of the young and susceptible growing cells.

For some years I have used, to considerable advantage, I think, in tissue repair a very fine catgut filament. It is 000 in size, or, more accurately, 31-32, Brown & Sharp standard wire gauge. In its most generally useful form it is chromicized to resist absorption for "forty days," which, in practice, means that under ordinary conditions of surgical use it will *not* be absorbed sooner than five to seven days; that is, not before the time when usually sufficient healing may be expected to have taken place, and the suture can be dispensed with. This holds good for the union of delicate structures which are not under tension. A young scar which is but five to seven days old is at this early period not very stable, and yields or ruptures if the part in the further course of healing cannot be kept free from strain. If, therefore, a filament of insufficiently chromicized gut is used where there is constant or varying tension, the result might be a reopening of the wound after the resolution of the suture. For this reason for the suture of the heart, blood vessels, bowel, bladder, there is required a filament of greater resistance, for instance, of "60 days," or even "80 days," which insures under adverse conditions retentive power for ***no less*** than 10-14 days. Thus also when the catgut filament is exposed to the action of secretions, discharges, or is moistened by douches or irrigating fluid, or is used in edematous tissues. Under the usual conditions of wound healing, however, filaments possessing such great resistance are unnecessary. When in a particular case the time which is required to secure a sufficiently firm scar is uncertain, or when the patient is in a low nutritional state, or where the line of repair is from the outset subject to constant or fluctuating tension, it is safer to use a fine thread of non-absorbable material, preferably silk. Thus in closing a hernial sac or the appendix stump by the purse-string method, or in doing an intestinal or gastro-intestinal anastomosis, or when suturing the bladder, heart or blood vessels, the silk thread, although it is practically inabsorbable, retains its legitimate place.

When the *surface* suture is likely to be bathed by infectious fluid, as in the angle of a discharging wound, or when moist dressings are to be applied, the use of a chromicized filament is not indicated. In its stead a non-absorbable thread, which can be extracted when it is no longer of service, should be employed. Linen or silk, unless specially prepared, is not the material of choice, because of its capillarity it invites, when contaminated, the conduction of infection along the stitch canal. The dense, smooth texture of silk-worm gut makes it well adapted for this purpose, and in filiform sizes it is finer and better than horse-hair or other animal substitutes.

The best method of closing the *cutaneous incision* after an asceptic operation, whenever it is feasible, is that by means of Michel's clamps. To avoid decubitus they must not be applied too firmly, and should be removed after five days. After that adhesive strips continue to support the young scar for a few weeks. There need be no fear that these clamps may be dislodged by the patient even if used on the abdomen to close an incision eight or more inches long. In hairy areas, as in the hypogastrium, they are particularly indicated because the possibility of a stitch infection is thereby precluded. In a few cases where the clamps are applicable, sterile zinc-oxide adhesive strips can be used instead at the time of operation. Before these are applied the skin must be thoroughly freed from fatty secretion with ether. The strips must adhere thoroughly to be efficient; it is therefore not well to employ them in hairy or glandular territory. From a cosmetic standpoint the result obtained by either of these

methods surpasses that obtainable by any suture method, subcuticular or cuticular, no matter how fine the suture material and how carefully executed the suture.

While endorsing the more extensive use of chromic filament in place of the coarser sizes of catgut or the inabsorbable silk thread, I would not have it mean the unrestricted replacement of these. Each suture material has its definite and rational indication. Chromic filament is a suture which, since it is only ooo in thickness, is so slender that the finest needles, eye needles, can be armed with it, and it is therefore frequently invaluable in refined surgery where silk or heavier catgut has hitherto been selected. It is not inabsorbable as silk, but absorbable. Furthermore, by chemical modification, chromicization, its degree of absorbability can be aproximately graduated to meet the conditions in the tissues just as accurately as this can be done with the coarser grades of catgut. It is only its inconsiderable tensile strength, the fact that it has to be handled with great gentleness when the suture is placed, that seems to militate against its more general adoption. But this objection must grow weaker as the conviction grows stronger that its tensile strength is quite sufficient for the purpose for which it is intended—the coaptation and not the constriction and strangulation of the delicate living fabric which it mends. This does not refer to the reconstruction of thick muscle strata or fascial planes as in hernioplasties or perineoplasties. In general, wherever bulky structures must be brought together, stronger chromic catgut, for example, No. 1 or No. 2, is clearly imperative for efficient retention.

In the repair of bone the physical conditions are such that absorbable suture is commonly inadequate. Only a few of the smaller bones may be an exception. Thus the patella may not infrequently be united with No. 2 "40 day" chromic catgut. The success of the suture is partly dependent on the efficiency of the repair of the soft parts, namely, the strong unyielding patellar ligament in which the patella is virtually encased, and not so much on the stability of the sutures which are passed through the canals drilled into the bone itself. In general, for the long bones the principles laid down for the repair of other tissues have to be violated. The bones are rigid structures, and if the reduction of a fracture is accomplished, the forces which tend to renew the displacement may be very great. Operation on the fracture is indicated in cases where reduction either cannot be accomplished without exposing and disengaging the fractured ends, or where the coaptation of the reduced fragments cannot be efficiently maintained by the usual mechanical methods. In some bones like the clavicle, wiring with silver wire may do; in others, like the tibia and femur, Lane's plates are by far the most serviceable in obtaining a rigid union. To the objection that a foreign body of considerable size is fastened to the bone in introducing Lane's plates, their inventor replies that they cannot be substituted by anything which is absorbable to secure a truly reliable fixation of the fractured ends, and that they can again readily be removed through a small incision after the fracture has healed, should they become a source of trouble. (A. H. Harrigan.)

At the present time the most satisfactory way of supplying sterilized plain as well as chemically modified catgut, is in sealed glass tubes. Since it is in this case necessary to rely on the efficiency of the sterilization of the gut by the manufacturers, many methods for its extemporaneous preparation have been suggested. While this tendency must appeal to one who is solicitous about asepsis and desirous to have under his control or supervision the sterilization of the catgut, which he needs in his operations, it must be granted, on the other hand, that the usual complaint about catgut sterility is not well founded. For example, from the record of one series of 120 cases in which catgut, plain and chromic, from one of the firms in this city was used exclusively, in not a single instance was an infection traceable to this source. Most infections of the skin occur when a hairy territory is invaded, because it is so difficult to render it aseptic, and not because the catgut was at fault. If the catgut were responsible for the ordinary stitch infection, why is it that the skin and subjacent fascia, or the skin alone, and not the deeper strata of the sutured wound, are most usually involved? Why is it that incisions in the hypogastrium near the pubes, or herniotomy incisions, are so prone to this complication. while when ordinary precaution is taken incisions elsewhere on the abdomen rarely show any redness or signs of local infection about the stitches?

If water were not incompatible with the catgut suture the problem of catgut sterilization would be a compartively simple one. As it is, sterilization by means of boiling water or superheated steam is out of the question, and the process is usually one in which disinfection and dry sterilization in its various forms are combined. A further difficulty presents itself in this that the medium in which the catgut is kept must be water-free, otherwise the tube containing it cannot be boiled. Catgut, plain and chromic, thoroughly desiccated, has therefore been put up in a medium consisting of chloroform and

alcohol. The tube containing the strand of suture material is but half-filled with the liquid to allow for expansion, and can be boiled repeatedly to sterilize the surface without impairing the catgut. With this preparation tubes containing kangaroo tendon can also be boiled, whereas if but a trace of water were present the suture would swell promptly and be converted into a rubber-like mass, having no value whatever as a suture. The tubes are boiled not so much in the hope of resterilizing their contents as to render their surface aseptic for the supply table. This precaution is a vital one, because the surface of the tubes is apt to become coated with a fatty layer, and bacterial contamination is the result of handling. If they are simply immersed in antiseptic solutions, most of which in addition, as corrosive sublimate, are practically incapable of penetrating the fatty layer, a germicidal action upon imbedded bacteria is doubtful indeed. If, however, the glass tubes are subjected to the boiling process in slightly alkalinized water (1:1000 NaOH), together with the instruments, absolute surface sterility is secured.

The question, what happens in the *interior* of the tube when it is boiled? is a natural one. In case the tube contains a mixture of chloroform and alcohol, which is absolutely water-free, and whatever may be the temperature to which this medium rises, when such a tube is boiled or placed in the steam sterilizer with the dressings, the only sterilizing effect which it can have on the contained strand of suture material is that which results from the action of *dry heat,* not wet heat; any trace of moisture due to water in the tube would be utterly incompatible with the catgut. According to the manufacturers a thermometer suspended in this chloroform mixture, within a sealed glass tube, indicates that the temperature of the mixture reaches approximately the temperature of the surrounding medium in the sterilizer. If this is correct, the additional sterilizing effect of this measure would be, in the one case, that of a dry sterilization of from 10-25 minutes at about 100° C. (212° F.), and in the other, that of a dry sterilization of not less than 35 minutes duration at about 121° C. (250° F.). That the sterilizing effect of this procedure can be but secondary in importance becomes clear when the degree of heat obtained and the time are compared with that which is necessary to insure unquestionable sterility by dry heat. Thus dry sterilization would require about three hours at 140° C. (284° F.), or about two hours at 180° C. (356° F.). As long as no water is admitted, subjecting such tubes to the action of boiling water (100° C.) or steam under pressure (121° C.) does not impair the quality of the suture. It is only when the dry heat is carried considerably beyond this point that charring results, and the material is destroyed. The only way, therefore, in which satisfactory sterilization of catgut can be obtained, without influencing the suture, is not by a single sterilization at very high temperature, but by *repeated sterilization at lower degree of heat.* It is not on the effectiveness of a single but of *repeated sterilization* that the sterility of surgical catgut really depends.

In practice, when this is convenient, silk is best sterilized with the operating-room wash and dressings by the action of steam under pressure. Dry silk is easier to handle than wet silk; and, secondly, boiling water when alkalinized seems to impair slightly the tensile strength of the suture. Similarly, silkworm gut suffers with repeated boiling in alkaline water, and can be rendered sterile in the autoclave with the gauze. If silk has to be sterilized by boiling, it is best boiled in *plain* water, just as silkworm gut, linen thread and rubber goods. Kangaroo tendon put up in sealed glass tubes in a water-free chloroform mixture can be submersed and boiled with the instruments in the same manner as the plain and chromic catgut. If the tubes are placed into the steam sterilizer a number of times, the kangaroo tendon may begin to "fibrillate" and loses its smoothness, thus becoming more or less unsuitable for the purpose of suturing.

To a great extent, the guaranty for the undoubted sterility of the animal suture used at operations has to be accepted from the laboratory which supplies it. It would be desirable to apply wet heat either by boiling or by means of steam under pressure to all suture material, but until an absorbable material which cannot be destroyed by hydration is found, extemporaneous sterilization by these methods is out of the question.

1041 Madison Avenue.

The next article will be "The Anesthesia."

The Olive Bougie in Esophageal Obstruction.

The olive bougie, passed without a guide, is a dangerous instrument. Only sufficient force barely to detect obstruction is permissible in its introduction. Any attempt to crowd an unguided sound past an obstruction may result in a perforation of the esophageal wall. A traumatic perforation of the esophagus almost invariably results in death. —H. S. Plummer in *The Journal-Lancet.*

FOUR DEATHS IN LATENT SINUSITIS.

GEORGE F. COTT, M.D.,
BUFFALO, N. Y.

CASE I. Girl, age 17, High School pupil, referred by Dr. Halbert. Extremely nervous before last sickness. Had grippe a number of years before, susceptible to colds which lasted indefinitely, pronounced masturbator. Present illness began six weeks ago; complained of headache and was unable to be up. Temperature variable, but constantly above normal; taken out but once a day—102° to 103°. When I saw her she was semi-conscious; right eye protruding. Both eyes mostly closed, but she could be aroused momentarily only again to lapse into semi-consciousness. Would move and act as if in pain. Kernig's sign present and neck muscle rigid. In the region of the ethmoid cells, denuded bone, but no apparent discharge from nose.

Diagnosis: Cavernous sinus thrombosis and leptomeningitis superinduced by latent sinusitis. Died three days after I first saw her. No post-mortem examination permitted.

CASE II. Physician, age 27; great edema of pharynx with considerable mucus simulating false membrane; mucous membrane intensely red. Culture showed streptococcus. Sick twenty-four hours. Next day a scarlet rash covered the whole body. He was removed to the contagious pavilion of the Sisters' Hospital and then treated by Dr. McLeod with mixed vaccine. He recovered in three weeks with but three injections. In the beginning of the fourth week he developed pain in the region of the sphenoid and he made his own diagnosis of sinusitis. Ethmoid cells denuded, but no exudate. The nose was flushed several days with warm boric acid solution which gave him considerable relief, but on the third day he said it caused him much pain. He then had stiff neck and Kernig's sign, Babinsky phenomenon absent, mild tache-cerebrale present. The fifth day he developed paralysis on right side and the sixth day, early morning, he died. Five years ago he suffered severely from influenza which, no doubt, crippled his sinuses, preparing a fertile field for the infection which followed the attack of scarlet fever.

CASE III. Girl, age 13; sent to the ward in the Buffalo General Hospital for ear trouble. She had pain in the head referred also to the right ear, but nothing was found upon examination. Tache-cerebrale very marked, Babinsky reflex absent, temperature above normal and variable, neck muscles rigid and Kernig's sign present, atrophy of nasal mucous membrane with crusts. The nasal cavities were washed out several times a day and the patient improved and was conscious, but hazy. Spinal fluid normal. On the third or fourth day the right auditory canal filled up with serous fluid which next day became perulent; ethmoid cells denuded. A few days later she became comatose and it was decided to explore the labyrinth. There was no chance to get a history of the case, the patient being an Italian, so we had no means of learning anything about her condition previous to the present attack. A radical operation was first done, then the vestibule opened. There was considerable softened bone, but no pus in the labyrinth. She died without recovering consciousness. Diagnosis: Leptomeningitis due to latent sinusitis.

CASE IV. Scotchman, age 60; referred by Dr. Frost, millwright, family history negative, married, two children, always well, except typhoid when a young man; never had headaches until within last four or five months. Earache April 9th. On the 11th, difficulty in hearing, right side. Had been having a cold. Canal completely filled with cerumen. Unable to hear watch on contact. April 13th, says the ear treatment used him up. Did not sleep last night and has been nervous ever since. Coughs a little and has pain in the top of his head. Says he is sore all around the right ear. Drumhead not visible because of the cerumen, which he will not permit to be removed. April 16th, came home from work at noon feeling bad, tinnitus troublesome, pulse 90, temperature 99.4°, feels weak, tenderness on the right side of head. April 20th, washed out right ear, but canal near drum was plugged with desquamated epithelium, tinnitus continues troublesome. At 12 that night got out of bed and was dizzy and had disturbed equilibrium. May 7th, same conditions. Ear discharging pus since April 26th. May 8th, in bed nearly all day, some dizziness. May 10th, felt better yesterday, not very dizzy. Had a restless night. Did not sleep until 6 a. m. owing to pain in head and ear. Short hacking cough. Had chills, temperature 103°, coughs occasionally, chest examination negative. Deep inspiration causes cough. Looks bad. Temperature 104°, pulse 112, respiration 36. At 10 p. m. has been lying on the right side to favor drainage. In this position crepitant râles may be heard on the right side, which disappear when turned to the left side. May 13th, complaining of severe backache, it hurts him to turn over, tongue very much coated; talks thick, hard to understand (which he says is due to not having his teeth in). Pulse 76, temperature 99.4°. May 14th, aortic systolic murmur, and subcrepitant and crepitant râles over right chest. Urine, sp. gr. 1026; no albumin; no sugar; diazo reaction, negative. May 15th, 4.45, temperature reached 103.2°, but after free bowel movement dropped in the afternoon to 102.2°, pulse 96; respiration 32; chest, negative; liver dullness extends very high anteriorly, due to a very short chest. May 16th, at Riverside Hospital, seems quite comfortable, but complains of his head when asked about it. Some gas in intestines, but not much abdominal distension. May 17th, 10 a. m., very heavy, but when aroused is rational; pulse 74; some ptosis of right eye; Kernig's sign present; sensation normal; no rigidity of neck. May 18th, temperature 98.6°; pulse 74; rational when aroused; very heavily somnolent or semi-stuporous condition. Skin looks better (sweat baths) than this morning, but some right ptosis and pupils contracting.

May 19th, 8:30 a. m., Dr. Cott saw him. Diagnosis in doubt, but prognosis unfavorable. Thought

trouble might be at the base of the brain, but did not come from the ear. Pulse about normal, temperature 100°, somnolent. May 19th, lumbar puncture made (causing little discomfort) and nine drams of very light amber fluid drawn off. Tachecerebrale and Kernig sign present; Babinsky phenomenon absent. Consultation with Dr. Cott until morning. May 20th, 8:15 a. m., somewhat brighter when aroused, otherwise condition unchanged. Mild nystagmus present towards well side. Tachecerebrale marked. Blood pressure 120. May 22d, 11:30 a. m., pulse 92; temperature 102°; respiration 32. Spinal puncture, 12 drams spinal fluid removed (previous specimen examined bacteriologically with negative findings). Blood pressure before puncture 100; immediately after 130. Nystagmus not apparent to-day. Almost insensible to pain as he has been for the past week or so. Blood examination by Dr. W. I. Thornton. Hemoglobin 95 per cent., leucocytes 20,910, polynuclears 93.2 per cent.; small lymphocytes 5.6 per cent., large lymphocytes 1.2 per cent.; no eosinophiles.

May 23d, 8:30 a. m., stupor more profound; temperature 102°, pulse 120, respiration 48. Examination of the chest negative. Dr. Cott proceeded to operate. The patient took very little ether. Went through mastoid (normal) exposed dura, opened middle and internal ear. Found no pus, but found the lateral sinus filled with a fat thrombus further than probe would reach. Although the operation took nearly two hours, the man left the table in nearly as good a condition as he went in, but he gradually failed and died in about seven hours without regaining consciousness. Post-mortem: Brain removed the following morning. Dura very adherent to skull throughout vertex, with a slight deposit of lymph along longitudinal fissure. Brain normal, also pia and arachnoid, fatty thrombus filled right lateral sinus from torcular Herophilli, through entire length.

Wherever I found denuded ethmoid cells I have always been able to trace them to an attack of la grippe, either recently or of a remote date, generally the latter, the patient having had a profuse discharge from the nasal cavities at that time, calling it a prolonged cold.

Infection travels along the sheaths of nerves or vessels reaching the meninges. The pain is not always severe, but headache in various portions of the brain is always present. Sometimes there is bulging of one or both eyes shortly before dissolution. Whether drainage would accomplish anything or not I do not know. In every case I have observed meningeal symptoms were marked, but those in which the spinal canal was tapped showed the fluid normal. Three were treated in this way.

It was possible to get an autopsy only in the last case, and then only of the brain. Here we found pachymeningitis over the whole dura, and the latter so strongly adherent to the skull that it was almost impossible to tear it off by main force. In a few sulci newly organized lymph was deposited. The other membranes looked normal. A large fatty thrombus was found in the right lateral sinus, which appeared to be of recent origin and gave no signs during life. The meningitis was of long standing and no doubt due to la grippe, which the patient had years ago. The only symptom he noticed was pressure pain on the top of his head.

As these cases will be frequently met with in the future, it may be well to drain the different sinuses of the skull and give the patient the only chance there is for recovery. It is, of course, doubtful whether any good would result, but for want of other evidence it might be wise to try.

By removing the middle turbinated bone one can easily flush the frontal sinus and curette the ethmoid cells. If necessary, the sphenoid may be opened and that cavity flushed out. The antrum of Highmore may be treated the same way with very little difficulty. If these patients are seen early, that is, when they have headache and eye symptoms, pain in eyes, partial blindness, before the meninges become affected, much may be done to avert the final catastrophe.

These cases invariably proving fatal, it might be worth while to tap the lateral ventricle, and at the same time do lumbar puncture and gently flush out the sub-arachnoid space. There is just a possibility of improvement following that procedure, relieving pressure and clearing out toxic material.

Exception may be taken to the remark that the cells are denuded of periosteum and mucous membrane as commonly found in individuals who had la grippe at some time. That is true, but we also know that it is not at all uncommon to have meningitis follow influenza, and here we have exposed all the vessels and nerves supplying the meninges and brain which had formerly been protected by the mucous membrane. Furthermore, a remote development in cases of la grippe is neuritis of the fifth nerve, which so abundantly supplies the dura as well as the pia matter. This has been proven time and again, because it improves so rapidly after draining the sinuses. The only plausible conclusion is that the meninges become infected through the ethmoid cells and sphenoid sinus or sheaths of nerves or vessels entering the cranium. Until we can have more post-mortem examinations it will be impossible to determine the exact source of infection.

The internal ear was drained in two of these cases to relieve a possible source of infection as the symptoms were considerably masked, and in one case the history obscure.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, MARCH, 1912.

WASSERMANN'S ACCOMPLISHMENT IN THE CURE OF MOUSE CANCER.

One of the most significant investigations in the elusive problem of the cure of cancer is reported in the recent publication of that penetrating and profound thinker, Wassermann.

His discovery, like Ehrlich's salvarsan, is the result of a beautiful series of deductions. Indeed, Ehrlich's discovery of salvarsan was the direct stimulant of Wassermann's researches. Wassermann started out with the idea of attacking cancer in mice by a substance which would be effective when injected through the circulation.

According to the classic work of Ehrlich on chemotherapy, remedies are of two kinds: organotropic, or those which affect the endogenous body cells, and parasitotropic, those which attack the invading organism without affecting, or affecting only indirectly, the body cells. To the latter class belongs salvarsan. In attacking cancer, Wassermann concluded that the remedy must be definitely organothropic, but only for a certain part of the organism, the newly formed tumor cells.

His experiments were based on observations that the metallic substances, sodium telluride and selenide, in solutions of which living cancerous tissue was suspended, were deposited only in the cancerous epithelial cells and not in other portions of the tissue, which seemed to show that we have in selenium and tellurium, substances which have a specificity for cancer cells. When Wassermann thereupon injected these metallic salts directly into mouse cancers, he noted a liquefaction of the tumor, which opened externally—a process which in some instances effected a complete cure.

In order to obtain more uniform results, he next injected these substances into the circulation, but the results were negative. Wassermann concluded that the failure was due to the fact that these metallic salts did not reach the tumor. He thereupon sought a substance which when mixed with them, would aid in a diffusion of these elements into the organs. For reasons which are not mentioned, he selected the fluorescin dyes for this purpose. After experimenting with a great number of these, he finally selected eosin, and the curative substance which he now employs is a loose combination of eosin and selenium.

In a mouse affected with cancer, a softening of the tumor is noted after the third intravenous injection of this combination. With repeated injections, the softening continues until the tumor has become a fluctuating sac. With the fifth and sixth injection, the resorption continues until the mass entirely disappears within ten days. In large tumors, a cure does not always follow; while the softening and liquefaction of the tumor proceed rapidly, the animals sicken and die. There is no question in Wassermann's mind that death is due to rapid absorption of the disorganized tumor. Small tumors, however, disappear regularly. Wassermann has observed the cured animals for many months, and in no instance has he noted a relapse.

Wassermann is very careful to insist upon the fact that his discoveries should not be immediately applied to cancer in the human subject. This is obviously the only attitude to take. Mouse cancers are biologically not the same as human cancers, and by some, especially certain English observers, the cancerous nature of the Jensen mouse tumor has been questioned. However, but whether or not Wassermann's discovery is ever applied to cancer in the human, it is of immense importance in demonstrating as a fact what had so long been fondly dreamed, but scarcely believed, that a neoplasm may be made to undergo a specific destructive process by an agency introduced into the general circulation that is harmless to the normal body tissues. It is the most distinct advance that has been made in cancer research. It is another

triumph of the theories and methods of this generation's greatest medical genius, Paul Ehrlich.

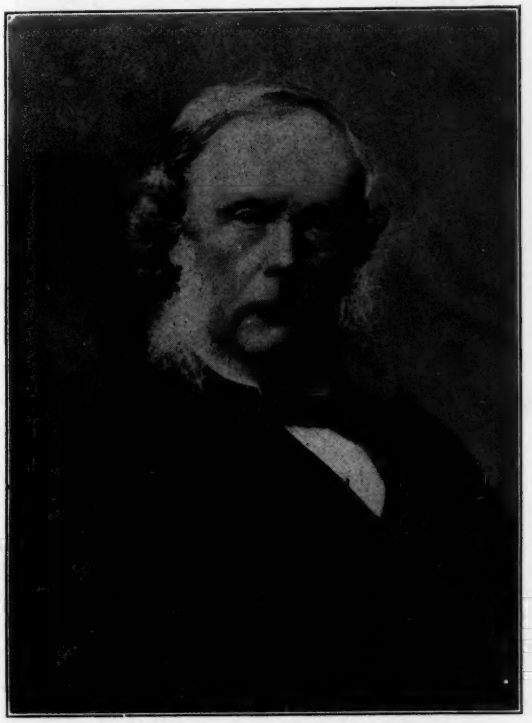
E. M.

LISTER.

"My Lord, it is not a profession, not a nation, it is humanity itself which, with uncovered head, salutes you."

The death on February 11 of Joseph Lord Lister, in his 85th year, is a loss chiefly sentimental to the profession he honored, and to the larger world he benefited; his work was done many years ago; he did not add, he could not well have added to it. But his life was monumental of one of the greatest achievements of civilization.

It takes nothing from Lister's glory to admit what he himself so often and so gracefully asserted, that antisepsis was based on the epochal and fundamental discoveries of Pasteur, Oliver Wendell Holmes and Ignaz Semmelweis had shown, clinically, that puerperal fever was communicable from individual to individual, and in at least one old and forgotten 18th century monograph there is found a clear enunciation of the hypothesis of the production of diseases by minute infecting organisms. The manner in which Lister had conducted dressings in his wards before Pasteur's discoveries, showed that he appreciated the communicability of putrefaction from wound to wound. And while he did not dispute the general belief that the oxygen of the air was responsible for putrefaction, it is evident from his writings and his teachings that he was not satisfied with it. He was sufficiently far ahead of the majority of his colleagues to believe that suppuration, instead of being a natural and inevitable incident to a process in wound healing, was an undesirable result of irritating wound discharges. His histologic and pathologic studies—and he had made painstaking researches in inflammation—and especially his astute clinical observations, had lead him to the belief that ideally, a wound should heal—as does an unexposed fracture—without inflammation, suppuration or sepsis.



Portrait of Lister in 1895. From "The Collected Papers of Joseph Baron Lister," Oxford University Press, 1909.

However, near or far from the exact truth were the notions revolving in Lister's mind at the time of Pasteur's discoveries, it seems beyond dispute that he was not only the first to apply these discoveries to medicine, but also the man most prepared and best fitted to receive and apply them. Antisepsis and asepsis may be regarded as the inevitable eventual development from Pasteur's discoveries, but when one remembers how slowly these innovations were adopted in surgery and how little they were for a long time understood. one may appreciate how much Lister advanced the ultimate and how many lives he is directly responsible for saving.

Within a brief time and full of years, Florence Nightingale and Joseph Lister have joined the immortals, Harvey, Jenner, Hunter, Simpson, whose names will perpetuate the world's debt to Great Britain.

W. M. B.

PERSONAL REMINISCENCES OF JOSEPH LISTER.

We are especially pleased to present in this issue a very timely paper of the Venerable Henry O. Marcy of Boston on his Personal Reminiscences of Lord Lister.

Any reminiscences of this distinguished American surgeon and gynecologist would be of very great interest, but those dealing with Lord Lister are at this time especially so.

Marcy was Lister's first American pupil, and it was he who, in addition to many other accomplishments, introduced Lister's antiseptic methods in this country.

W. M. B.

Surgical Suggestions

Vesical calculus is very common among the Chinese, appendicitis very rare.

Creeping infants may gather wood splinters or needles in their hands or knees, and abscesses in those localities should suggest such an etiology.

When it causes suppuration, a foreign body is usually easily found, but if there be difficulty in locating it, it is better to be content with drainage for a few days rather than expose uninfected areas by a prolonged search.

A subcuticular whitlow is often the superficial expression of a deep infection. After removing the raised epidermis carefully inspect the tissue beneath for a small opening. If this is neglected the process may speedily advance to the tendon sheath.

When dealing with a sliding hernia don't attempt to separate the large bowel from the sac; this attachment carries the blood supply of the gut. Free the sac, not the intestine, and reduce with the bowel as much of the sac as is attached to it.

Active hemorrhage from a gastric ulcer is rarely fatal; the weight of evidence indicates that it is better to operate after than during the bleeding. Active hemorrhage from a duodenal ulcer is often fatal; operate as soon as the diagnosis is made.

Gastro-enterostomy should not be performed unless there is, or is deliberately made, an obstruction in the duodenum or at the pylorus. If these remain or become, patent the food will not be diverted through the artificial channel.

A needle fragment in the fleshy palm, where the muscles are compact and in more or less constant activity, will be displaced more in a few hours than one in the sole of the foot, where the intrinsic muscles are deeper, less compactly disposed and less active, and where, also, the dense plantar fascia sometimes holds the needle.

In the palm, foreign bodies, by reason of the direction of the thrust, often point towards the dorsum and, in a general way, towards the center of the wrist, and such movements as they undergo by muscular contractions carry them further in those directions.

Surgical Sociology

Ira S. Wile, M.D.
Department Editor

INDUSTRIAL INSURANCE IN THE CARE OF THE INJURED IN GERMANY.

CHARLES H. JAEGER, M.D.
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NEW YORK.

One billion five hundred million dollars is the sum that has been paid to sick, injured and disabled workmen in Germany during the past twenty-one years.

This is the remarkable result of the Industrial Insurance legislation—in other words, their compulsory insurance laws, the idea of which originated in Germany in 1883, and has since been adopted in England and France, and, in fact, in most of the countries in Europe.

The Industrial Insurance legislation includes insurance against sickness, accident and invalidism, as well as old age. The various measures have been repeatedly revised, improved and extended, but they may be briefly described as follows:

The first legislation providing insurance against sickness was passed June 15, 1883. The purpose is to insure a certain and sufficient relief in case of illness during at least 26 weeks; the employee pays two-thirds of the sick insurance and the employer one-third.

In general, all persons *regularly* employed in factories, mines, on railways and in other industrial concerns, shop assistants, employees in State services, employees of lawyers, etc., overseers, engineers, etc., must be insured. While those *intermittently* employed, those in dependent positions, employees of the empire (army and navy), etc., who are otherwise entitled to pensions and free medical aid, are exempted. Other persons, like servants, children, etc., may or may not be insured.

The condition of a workingman insured against sickness in Germany may be shown by an illustrative example:

His wages being $6 per week he pays 12 cent. per week in assessments. The financial aid to which he is entitled in case of sickness is $3 per week and the cost of medical attendance and medicines. If he is sick during 13 weeks the allowances which

he receives amount to 234 marks—$58.50. The funeral indemnity is at least $20. Besides this the family frequently receives free medical attendance.

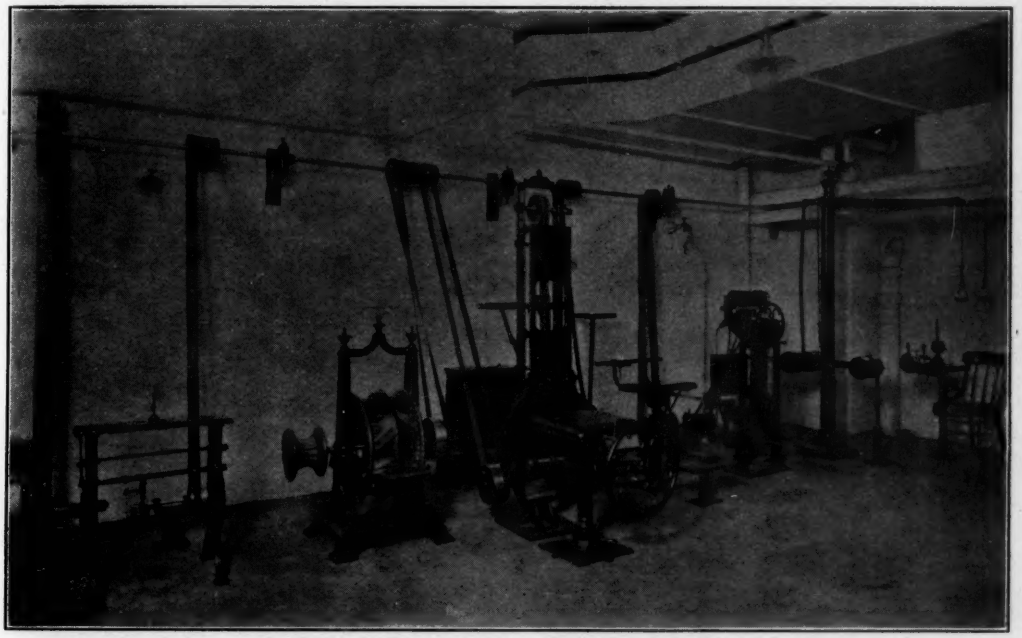
The results of this institution were so beneficent that it rapidly developed in scope and soon covered, besides sickness, also accidents, invalidism and old age.

Accident insurance was commenced in 1884, and at first it dealt chiefly with industrial enterprises, but it has been much extended. Accident insurance is at the cost of employers wholly. In general all employees and overseers with salaries less than $750 must be insured. The employees form themselves into associations by their trades (*Berufsgenossenschaften*), which not only manage the insurance funds, but may require measures, safeguards, etc., against accidents. These associations are self-governing and are all under the supervision of the Government.

In a case of Government employees the Government manages the insurance. The various trades are graded according to the degree of risk. Compensation must be paid even though there be negligence on the workman's part, unless the accident is caused intentionally. The compensation begins 13 weeks after the accident, the sick fund or employer being responsible meanwhile.

In case of fatal accidents one-fifteenth of the yearly earnings is paid, with a minimum of $12.50 and a pension to the widow till death or remarriage of 20 per cent. of the earnings, and also to every child up to the fifteenth year. Other dependents, *e. g.*, parents, grandparents, grandchildren, or a husband through incapacity dependent partly or wholly on his wife, are also provided for. Details vary considerably with the occupation.

Let me give an example of a workman insured against accident. If a mason, whose wages amount to $316 yearly, falls from a scaffolding and injures his chest, he immediately receives the sick benefits and hospital treatment at the expense of the employees' accident insurance corporation. This costs the corporation $76. During this time his family, composed in the selected example of a wife and two children under fifteen, receives a pension of $39. If at the end of the hospital treatment the injured man is totally incapacitated for labor he receives an annual pension of $210. If he dies because of his injuries his family receives a funeral benefit of $21 and a pension of $160 a year. The widow receives this pension until her death or remarriage. The children receive a pension until they are over fifteen years of age.



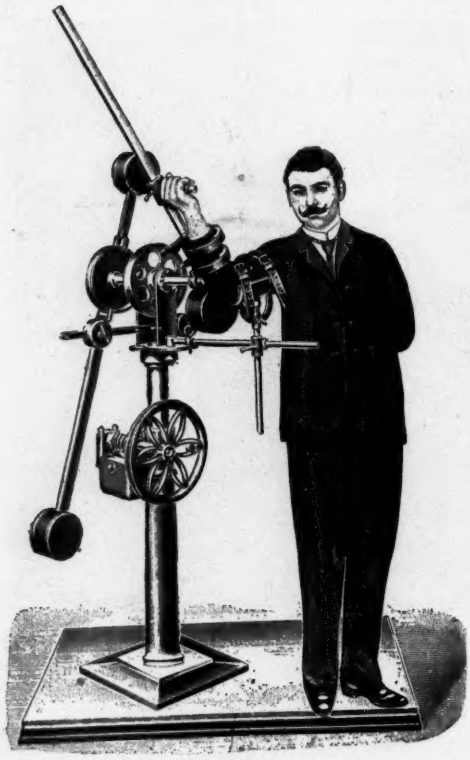
Group of Passive Movement Machines, in the Vanderbilt Clinic, New York City.

Invalidism and old age insurance was enacted June 22, 1889, and subjects to compulsory insurance after sixteen years of age all persons regularly working for wages in every branch of trade, apprentices and servants included, managing officials and commercial assistants with regular salaries up to $500. This insurance fund is formed by equal

contributions from employers and employees, and an imperial subsidy amounting to $12.50 per annum is granted to every annuity.

In order to be able to give immediate relief stations have been established; of these some are clinic stations provided with beds, other places for dressing wounds, with a doctor and permanent assistants in attendance. They have telephonic connection with the factories and establishments served and are open day and night.

However important the first care to the injured



Machine for Elbow Flexion and Extension.

may be, medical and financial, there is another question equally important—to provide that a victim of an accident may recover fully from his injuries. It may take him weeks, months, or even years to regain his full capacity for work and to qualify for steady employment. The problem that the scientists have tried to solve is to reduce the period of convalescence by means which only the wealthy of other countries could afford. The combination of mechano-therapeutics and surgery is employed for this end.

The German sick benefit associations have also sought to improve the hygienic condition of employment. Circulars have been sent to heads of establishments recommending certain sanitary measures; they distribute among the workmen pamphlets advocating measures of sanitation. In Berlin a commission was established by the sick benefit society to provide courses of lectures on questions of hygiene given by specialists and physicians free to the members and their families. The courses comprise lessons, treatment of dwelling, of food, of hygiene for children, of the care of the skin and clothing, of contagious diseases, of disinfection, of industrial hygiene in general, of the hygiene of the eye, ear and house and, finally, of the legislation respecting workingman's insurance.

At the end of 1907 in all about 81,000,000 persons (sick, injured, invalids and their dependents) had received $1,512,000,000 in benefits. The work-

Machine for Wrist Flexion and Extension.

men have contributed less than one-half the premiums and have received 2,000,000,000 marks more than they paid in.

Property is owned to the amount of 2,000,000,000 marks, of which 624,000,000 marks have been invested in model workmen's dwellings, hospitals and convalescent houses, sanatoriums and similar institutions of welfare. The conviction reached by all writers on compulsory insurance is that better and more efficient individual care of the injured is assured. The injuries are treated more promptly, with the result that they assume less severe aspects and the recovery is more rapid and the final disability less severe.

One therapeutic agent that can be credited with having done more than any other to produce these results is mechano-therapy. This is a system of therapeutics which exerts its action on the weak and

diseased body by means of massage and medico-gymnastics. Both endeavor by mechanical means through given stimuli to influence the organism for local as well as for general derangements.

Joints that have become stiffened by injuries, disease or long wearing of splints must be loosened up. The adhesions must be broken. Muscles that have become weakened through injury or disuse from long confinement must be strengthened and restored to full working capacity. A skilful masseur can do this, but only at a great expenditure of time and money. Machines have been devised to provide for a large number of patients and to put the necessary treatment within the reach of all. These supplement, in some cases supersede, the work of the masseur. These machines have for their purpose the gradual moving of the joints and gentle exercise of the muscles.

They are so scientifically constructed that the joint to be moved works in the exact physiological line. They are capable of such delicate adjustment that the most tender joint or weakened muscle can be placed in the machines and made to work without pain or effort. In fact, when the patient is powerless to make any movement a motor can be attached which passively moves the patient's joint.

There are machines for flexion, for extension, stretching, turning, kneading or vibration. Special machines have been constructed for each joint, and for every normal motion of each joint. They range from the smallest motions of each individual finger joint to the widest range of the hip or spine.

Some years ago I sent almost a thousand letters to physicians and hospitals in Germany requesting information as to the number of machines they possessed, the length of time that they had been using them and how many patients approximately they had treated in one year. Some had been using them for twenty years, some of the larger hospitals had treated 2,500 patients in one year. A question put, the answers to which were of great interest, was whether they had used medico-gymnastics to hasten convalescence from disease or operations not relating particularly to joints. This was answered by most in the affirmative, and the consensus of opinion was that convalescence was hastened and its duration diminished by 33 1-3 to 50 per cent.

This means that without increased equipment or extra cost the value of a hospital using this treatment is increased by a large per cent. A careful estimate shows that 350,000 patients yearly are getting the benefit of this treatment in the thousand or more institutions which already exist in Germany.

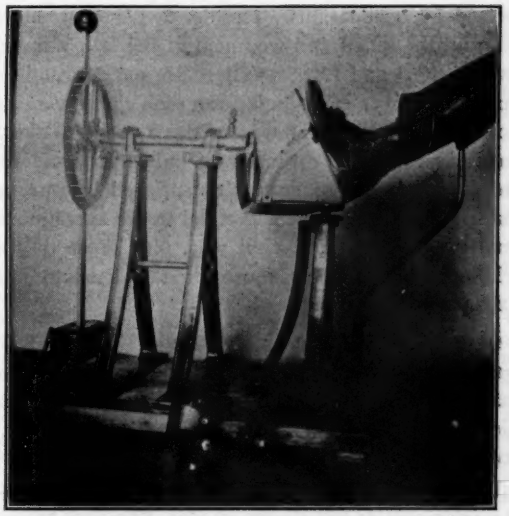
The principal merits of the German workingman's insurance are:

1. It includes fundamentally everybody needing insurance, in this way differing from other insurance companies.

2. It furnishes for the workingman the most comprehensive provision, as it offers not only support by money, but also free medical aid, free medicines and free boarding in institutions.

3. It offers the workingman the surest and cheapest system.

4. The means and powers of the nation, concentrated in the workingman's insurance, have made it possible to solve other problems of civilization, as,



Krukenberg Pendulum Apparatus for Pronation and Supination of Foot.

for instance, the systematic advancement of popular hygiene and the art of healing in connection with accidents, fight of tuberculosis, housing of workmen, etc.

And another merit of the system, one which I cannot emphasize too strongly, is this: After an accident or death the victim or his beneficiaries do not need to go through slow, tedious or expensive litigation; they do not need the services of any one acquainted with law. They receive the indemnity provided by the regulations, naturally, automatically, as a simple matter of, I should say, office routine. Or let us say the workingman has invested a part of his saving in a sort of corporation, subject to no market fluctuations, his indemnity is a sort of dividend coupon some accident obliges him to redeem.

In spite of the liberal payment of indemnities you may learn to your surprise that there is a large surplus every year. Of the surplus funds $100,000,000 have been applied to the erection of model work-

men's houses, hospitals and sanatoriums, to health resorts, people's bath and similar institutions for the advancement of the wellbeing of the public, and large sums have been spent in the fight against tuberculosis.

How many people are deriving the benefits of this humane legislation? In round numbers 11,500,000 are insured against sickness, over 18,000,000 against accident and almost 14,000,000 against invalidity and old age.

And how are conditions in this country?

Dr. Josiah Strong estimates the number of killed and wounded in the army of labor as over 550,000 annually. This does not include sickness and death caused by occupations. This is 50 per cent. more than all the killed and wounded in the late war between Japan and Russia. There are more casualties on our railways in a single year than there were on both sides of the Boer war in three years. Taking the lowest of three estimates of industrial accidents the total number of casualties suffered by our industrial army in one year is equal to the average annual casualties of our civil war, plus those of the Philippines war, plus those of the Russian and Japanese war.

As yet America has no system of industrial insurance, but a beginning has been made through local societies, trades unions, fraternal societies, employers' initiative, private corporations, casualty companies, etc.

Now let us observe the pitiful condition of the American workingman, the victim of an accident or injury. Of course he is treated in our hospitals and dispensaries, but only so long as he needs a splint or dressing. When the bone has healed or the wound closed he is discharged as cured, although it is very evident that the muscles are still weak, the joints stiff and he is in no condition to return to work. It is left to the patient's own devices to exercise his muscle or loosen his joints. The importance of early and persistent treatment of such cases is recognized, for only by promptly working on these joints can one hope to prevent further joint adhesions or contractures of ligaments and muscles. The earlier the treatment is begun the shorter it will be and the more certain of results.

The man of means can have a masseur, or can and does go to Europe, where proper facilities exist, but the workingman, the man with a trade, who needs all his physical strength and dexterity, and to whom the question of early return to full working power is a matter of vast importance, is deprived through a total lack of mechano-therapeutic institutions in this country of this most beneficial treatment.

We are confronting a sociological problem of great magnitude, for we cannot estimate how many previously honest, hard working men, after a disabling injury, are started on a career of pauperism and crime.

There are to-day in New York six institutions containing mechano-therapy machines. The German Hospital was the first to introduce them, and in its first year of existence had nearly 14,000 visits.

In this country the burden entailed by industrial accident is borne entirely by the worker. In addition to the suffering and mental anguish he must lose his wages while unable to work; he must bear the expenses of his medical treatment; or, if he dies, his family must pay the burial expenses. If he recovers he may not have the same working capacity and, consequently, for the rest of his life must accept lower wages.

I do not need to draw conclusions: facts speak for themselves. Our irrational and erratic system, the aim of legislation which seems to be to add the handicap of poverty to that of physical disability, has had its day.

Each one of us has to contribute in a certain measure to the welfare of the community. The more we increase each individual's efficiency the better off the community will be. Poverty, disease and disability are economic waste.

471 PARK AVENUE.

Book Reviews

The Taylor Pocket Case Record. By J. J. TAYLOR, M.D., 252 pages. Limp leather. Philadelphia: MEDICAL COUNCIL CO. $1.00.

This book supplies a convenient form for a condensed record of each important case, in pocket size, so that the practitioner can have it always with him, and so arranged that the necessary data can be written down in the briefest possible time—preferably while the examination is actually being made.

The blank for the first thorough examination, diagnosis and treatment is followed by spaces for sixteen subsequent visits.

The book provides for 120 cases.

The Conquest of Nerves. A Manual of Self-Help. By J. W. COURTNEY, M.D. Duodecimo; 209 pages.

This readable little manual is intended to place in the hands of neurasthenics and other "nervous" people as a help to their treatment.

BOOKS RECEIVED.

Tuberculous Diseases of the Bones and Joints. Their Pathology, Symptoms and Treatment. By SIR W. WATSON CHEYNE, BART., C.B., F.R.S., F.R.C.S., D.Sc., LL.D., etc., Professor of Clinical Surgery at King's College Hospital, etc. Duodecimo; 404 pages; 170 illustrations. London: OXFORD UNIVERSITY PRESS, 1911. $5.50.

Progress in Surgery

A Résumé of Recent Literature.

On Jejunal Ulcer. B. G. A. MOYNIHAN, Leeds. *The Universal Medical Record,* January, 1912.

In a very interesting article Moynihan points out that with the present perfection of gastric surgery, there is but a single serious complication to be faced in cases of gastro-enterostomy, and that is jejunal ulcer. Over 100 cases of this complication have been reported, remarkably few, however, by American authors. Ulceration at the line of suture, or in the jejunum very close thereto, occurs almost exclusively after operation for simple disease. As a rule, the ulcer lies exactly on the line of the anastomosis or very close to it on either side in the bowel. The ulcers, though occurring after any of the various types of gastro-enterostomy, seems most frequent after the anterior type. Symptoms of the condition may appear from 10 days after the operation to 10 years later, the largest number in the statistics occurring from three to 18 months after operation.

The etiology of the condition is not yet clear, but probably various causes are at work. Among these are: A bruising of the edges of the anastomosis or the formation of a hematoma in the wall of the gut; persistent presence of excessive quantities of HCl; smallness of the opening; or the tearing and irritation of an unabsorbable inner thread. According to Moynihan it is probable that the jejunal ulcer is due to a persistence of those causes which led to the formation of the chronic ulcer for which the gastro-enterostomy was done. As gastric and duodenal ulcers in the writer's opinion are always secondary to an infection elsewhere, this should always be looked for, and especially the condition of the appendix carefully investigated.

Clinically there are four types of jejunal ulcer. 1. The ulcer develops rapidly and perforates shortly after the operation. This type is unusual. 2. The ulcer develops within a few weeks or months after the operation, and the symptoms suggest a recurrence of the original disease. 3. The ulcer develops slowly and insidiously undergoes a subacute perforation with formation of a tumor in or near the epigastrium. 4. The ulcer perforates into a hollow viscus.

Treatment may be extremely difficult. An acute perforation may require only suturing. In chronic ulcers resection of the gut with a new gastro-enterostomy may be needed. In some cases it may be necessary to approach the ulcer from within by an incision through the anterior wall of the stomach.

The Treatment of Perforated Duodenal Ulcer. (*Zur Behandlung des Perforierten Duodenalgeschwürs*). A. HOFMANN, *Zentralblatt für Chirurgie,* December 16, 1912.

Hofmann reports a case of perforated duodenal ulcer in which, owing to the friability of the walls, suture was not possible. He thereupon performed a posterior gastro-enterostomy. He then covered the perforation with the under surface of the liver and kept this organ in place with a firm gauze packing between the upper surface of the liver and the lower ribs. The patient made an uneventful recovery and no duodenal fistula developed.

The Etiology of Appendicitis. (*Die Etiologie der Appendicitis*). PROF. DR. OBERNDORFER, Munchen-Schwabing. *Medizinische Klinik,* December 31, 1911.

The question of etiology of appendicitis, according to Oberndorfer, may be regarded from three points of view:

1. Does the idea of a "closed cavity" from a purely mechanical standpoint alone account for the production of appendicitis?

2. Is disease of the appendix a metastatic, embollic, hematogenous infection similar perhaps to vegetative endocarditis in articular rheumatism?

3. Is appendicitis an infection *sui generis* similar to diphtheria or tonsillar anguina?

The mechanical theory and the hematogenous theory have not received ample support outside of Diurlafoy and Talamon, on the one hand, and Kretz on the other. The great majority of cases of appendicitis cannot be explained by these theories. In appendicitis, as a pure infection similar to tonsilitis, Oberndorfer sees a more logical explanation. He bases his idea on the work of Albrecht and Sahli, both of whom have drawn attention to the similarity in histological structure between the tonsil and the appendix. Both organs show the same abundance in follicles, both have crypts and folds, and in both organs there is an imperfect, interrupted surface epithelium which is more susceptible of bacterial invasion than any other part of the alimentary tract.

In half of the number of cases studied by the author, excluding the acute cases, there was found evidence of previous attacks in permanent changes in the connective tissue, in the deeper layers of the submucosa and muscularis. Coproliths are frequently found at such points and are to be regarded as secondary to the insidious and chronic infection, and not as a primary cause of an acute appendicitis, as was formerly supposed. The ultimate pathogenesis is, however, by no means cleared up. In spite of progress in the anatomy and histology of appendicitis, it still remains an open question whether the appendicitis should be regarded as an infection *sui generis* or as an acute suppurative disease to be explained on a mechanical basis.

Relation of Chronic Appendicitis to Colitis. M. V. TYRODE, Boston. *Boston Medical and Surgical Journal,* January 4, 1912.

Tyrode believes that appendicitis is the local manifestation of a low-grade catarrhal inflammation of the colon, and that there is usually some inflammation of the cecum—a typhilitis—preceding the attack of appendicitis. The best proof the author offers of his contention is that many cases of appendicitis are not cured by the operation, but are afterwards cured by adequate medical treatment of the colitis. The persistence, in many cases, of pain after appendicectomy is accounted for by the same theory. The author quotes many authors in the recent literature to prove his contention. The importance of recognizing the relation of colitis to appendicitis is twofold. First, at operations for chronic appendicitis, other possible causes for the symptoms, such as gall-bladder disease, pyloric or duodenal ulcers, kinks and adhesions of the intestinal tract should be sought for. Secondly, unless an undoubted previous attack of appendicitis has been present, medical treatment of a colitis should be given a trial before rushing the patient to an operation.

Hematuria in Appendicitis. (*Ueber Hämaturie bei Appendicitis*). A. VON FRISCH, Vienna. *Wiener Klinische Wochenschrift,* January 4, 1912.

Frisch has analyzed 13 reported cases from the literature, and finds that in six the hematuria was due to adhesion of the appendix to the ureter. In three, the inflammatory process involved the kidney; in two cases, the hematuria was ascribed to toxemia, and in the remaining two no cause could be discovered. He reports two additional cases. In the first, he believes the hematuria was due to compression of the right kidney from an associated fecal impaction in the colon. In the second case, the cause was obscure, but he believes the blood in the urine was probably due to an embollic or thrombotic processes.

The Movable Cecum. C. A. ROEDER, Grand Island, Neb. *New York Medical Journal,* January 20, 1912.

1. A movable cecum may be productive of symptoms resembling chronic appendicitis.

2. A high cecum may be a movable cecum producing symptoms.

3. On finding only a kinked appendix and a pronounced anterior ileocecal fold, look for a prolapsing cecum and a Lane kink.

4. The type of constipation produced by a prolapsed ce-

cum may be due to traction on and narrowing of the ileocecal valve.

5. Some cases of pylorospasm may be due to narrowing of the ileocecal valve by traction of the cecum.

6. Wilms's cecopexy, Murphy's sigmoidopexy, Lane's ablation and anastomoses, all efforts to relieve stasis, show a variety of opinions on surgery to remedy functional conditions of the colon and indicate the necessity for further study.

Normal Human Blood-Serum in Melena Neonatorum and Other Conditions. J. E. WELCH, New York. *The Therapeutic Gazette*, February 15, 1912.

Drawing his conclusions from a series of thirty-two cases of hemorrhagic disease treated by means of injections of human blood-serum, Welch calls attention to the remarkable therapeutic effect obtained. Not only in melena neonatorum, but also in hemophilia, uncontrollable epistaxis, and in septic peritonitis have splendid results been obtained. He emphasizes the dangers attending the use of alien sera and contrasts these with the harmlessness of the injections of homologous, i. e., human serum. Large quantities of serum are used—for instance, in a case of hemophilia in a five-year-old child 1034 cc. were administered hypodermatically in the course of five days. In a new-born child weighing 5 pounds 12 ounces, 630 cc. of serum were given in the course of seven days, the case going on to recovery, although at the outset the prognosis appeared practically hopeless.

Welch believes that the rapid cessation of the bleeding after administration of the serum is due to the effect of the serum of the endothelial cells lining the blood vessels.

Large Bilateral Bartholin Cysts. SOLOMON WIENER, *American Journal of Obstetrics*, February, 1912.

Bilateral Bartholin cysts may sometimes, as in the case Wiener reports, become so large as to actually obstruct the introitus vaginae. The only correct treatment, even in complicating pregnancy, is total extirpation. The conditions with which Bartholin cysts of large size may be confused are hernia, hydrocele of the canal of Nuck, cyst of Gaertner's duct and solid tumors of the labium (fibroma, myoma, lipoma). Abscess, hematoma and malignant growths will hardly offer any difficulties of diagnosis. In doubtful cases it is wiser to trust to a careful exploratory incision to determine the diagnosis and therapy, rather than to the aspirating needle.

Interpretation of Uterine Curettings. ROBERT T. FRANK, New York. *The American Journal of Obstetrics*, February, 1912.

Frank calls attention to the all too frequent routine curettage. From his own study and that based upon Hitschmann's and Adler's he is led to the following conclusions:

1. That *anatomical* evidence of inflammation is demonstrable in less than 38 per cent. of all cases.

2. That many cases which anatomically show the presence of inflammation give no corresponding *clinical* symptoms.

3. That a majority of cases which show the conventional symptoms of "endometritis" (leucorrhea or bleeding) are wanting in demonstrable microscopic signs of inflammation.

4. That, therefore, in most cases, we are obliged to search for other etiological factors to account for the symptom complex hitherto called "chronic endometritis."

The author points out especially the relationship between uterine hemorrhages and disturbances in ovarian function.

An Early Symptom of Extrauterine Pregnancy. (*Über ein Frühsymptom der Extra-uterin-Gravidität*). PROF. DR. A. SOLOWIJ, Lemberg. *Zentralblatt für Gynäkologie*, February 3, 1912.

Solowij calls attention to the diagnostic importance of examining the cul-de-sac of Douglas in all cases of suspected ectopic gestation. Special note should be taken of the resistance felt in the posterior fornix at the first examination of the patient. If within a few days another examination elicits a doughy resistance in the Douglas pouch, in spite of the extra-uterine mass. Solowij proceeds at once to a laparotomy. In two typical cases cited in the article the author depended solely upon this sign and he regards it as absolutely reliable.

Cesarian Section. A Study Based on 104 Operations Performed by the Writer. ASA B. DAVIS, New York. *Bulletin of the Lying-In Hospital of the City of New York*, 1911, No. 2.

Davis advocates the use of the high median incision in Cesarian section. He has employed this in the majority of his cases. In thirteen cases Cesarian section was performed twice successively; in one case five times. The danger of repeated Cesarian section is rupture of the uterus. This occurred twice in the author's series of cases. At the same time it is preferable to allow a patient to come to a second operation than to render her sterile at the first Cesarian operation. Besides the classical indications for Cesarian section Davis includes a large proportion of eclampsias and certain cases of well marked placenta previa; also "a class of cases in which the Cesarian operation comes into competition with delivery by forceps, podalic version, accouchement force, pubiotomy or some of the so-called Cesarian sections with various prefixes," the surgeon seldom regrets electing Cesarian section. The most favorable time in which to perform the operation in those cases which are under observation before labor is the actual beginning of labor. This will prevent delivering of a premature child.

The immediate danger of the operation is hemorrhage. This may arise either from the uterine wound or from the placental site. In either case temporary gauze packing will control the bleeding. At the placental site the passage of a few deep sutures may sometimes be necessary. Shortly before starting the anesthetic 25 minims of ergotole are injected deep into the muscles in order to guard against atony of the uterus and undue hemorrhage.

This book gives a condensed discussion of the best methods of treatment, with a well-tried, reliable formula occasionally to illustrate the application of the principles. It is intended for hasty reference.

On the Construction of an Artificial Vagina. (*Ueber die Bildung einer Künstlichen Vagina*). W. STOECKEL, Kiel. *Zentralblatt für Gynäkologie*, January 6, 1912.

In recent years the chief indication for attempts at a plastic construction of an artificial vagina has been to make copulation possible. It had not been found feasible to restore the menstrual function in cases of absence of the vagina. Of all the methods proposed and hitherto tried Stoeckel approves of Baldwin's, and in the one case he reports he follows essentially Baldwin's technic. This consists of isolating about 25 centimeters of ileum with its corresponding mesentery at a point 30 centimeters from the ileocecal junction. The ileum is divided by the Paquelin cautery. The four ends are closed by purse-string suture. Continuity of the ileum is restored by lateral entero-anastomosis. The cavity for the new vagina is previously prepared from below by making a transverse incision over the hymen and deepening it by dissecting up the loose tissue comprising the recto-vesical septum as far upward as the peritoneum. A tampon of gauze is placed in this cavity. A silk thread is now passed through the mid-point of the isolated portion of the ileum at its mesenteric attachment. The peritoneum is perforated by means of a dressing forceps from below through the cavity made between the rectum and bladder. The opening in the peritoneum is dilated, the silk thread is drawn down into the arificial vagina cavity, resulting in two parallel vertical segments of ileum. The abdominal incision is closed by layer sutures. The isolated portion of ileum is now drawn down till its closed middie end appears externally. It is then secured by a few catgut sutures in front and behind; an incision is made into it and the edges are sewed circularly to what corresponds to the hymen. There results in this way a sort of vagina duplex whose canal measures about 10 centimeters, with a septum dividing it into an unequal right and left half. Irrigation of the new vagina with boric acid solution and tamponade of both compartments with gauze.

Stoeckel's case was successful. Experimental advantage was taken of this novel isolation of a portion of in-

testine in order to determine the effect of diet on the amount of secretion. It was found that a mixed diet with a minimum of albuminous foods was most favorable and gave least secretion.

Stoeckel resorted to the injection of 30 cc. of camphor oil intraperitoneally before laparotomy to get a good peritoneal reaction, which he regards as a prophylactic measure in unclean abdominal work. He also found that whereas, at the beginning of the operation cultures from the peritoneum were sterile, at the close of the operation cultures showed the presence of the colon bacillus. In spite of this his patient made an afebrile recovery, which he ascribes to the preliminary injection of the camphor oil.

An Ideal Abdominal Incision for Pelvic Surgery in the Female. C. G. CHILD, JR., New York. *Journal of the American Medical Association*, January 13, 1912.

Child offers what he considers an ideal incision and an improvement on the Pfannenstiel incision for pelvic surgery in the female, which has the advantages of being in close proximity to the pelvic organs, being easy to perform, freedom from shock and postoperative hernia, high percentage of primary union and perfect cosmetic results. It is also adaptable to other operations than pelvic surgery. Primary wound union occurred in his cases in 97 per cent. This was partly due to the use of non-infectable suture material, but he thinks the technic of the incision itself was contributory. With the patient in the Trendelenburg position, a transverse incision, two to 4 inches in length, is made in the edge of the suprapubic hair or in the transverse skin fold usually found just above it. This avoids some blood vessels which might be cut with a semilunar incision. It is seldom necessary to ligate more than two or three vessels and often no ligatures at all are needed. "The wound is now stretched with the fingers, thereby slightly enlarging it and better exposing the underlying fascia. After operation, contraction back to the original size of the cut occurs. The fascia is next incised in the same direction and to the same extent, one to two inches above the symphysis pubis. The extent of the fascial incision to either side should be limited by the outer borders of the recti muscles, and if a larger opening is required, the incision should be curved upward, or follow the outer borders of the rectal sheaths directly upward, to avoid injury to the external rings. Dissecting the fascial flaps free from the underlying muscles, which can readily be done by blunt dissection with the finger (from the linea alba they must be cut with the scissors), discloses the two recti overlapped by the pyramidales. The right pyramidalis is separated at its outer edge from the underlying rectus but not from the linea alba, and is retracted to the middle line. Under this the rectus is separated from the middle line and retracted outwards. The peritoneum now lies exposed, and the abdominal cavity is opened by a vertical incision. The lower flap is retracted by a self-retaining retractor, preferably that of Doyen, and the upper one by a small movable abdominal retractor. These are the only permanent retractors required. Of great assistance during the remainder of the operation are two Pryor trowels, which make possible perfect retraction in what would otherwise be inaccessible portions of the operative field, and which can be made to illuminate many a dark area with light reflected from their polished concave surfaces. When the operation is completed the wound is closed in three layers—the peritoneum, fascia and skin."

A Study of and Deductions from Fifty Fatal Cases of Puerperal Fever. HERBERT MARION STOWE, Chicago. *Surgery, Gynecology and Obstetrics*, January, 1912.

As a result of his investigation of the fifty fatal cases of puerperal fever which are reported in detail in his paper, Stowe is of the opinion that conservative treatment might have prevented the fatal issue in a great number of these cases. The instrument, as dilator or curette, has no place in puerperal sepsis, and the use of the curette after full term delivery should not be sanctioned. It is absolutely ineffectual and absolutely dangerous. A sapremia associated with good drainage and uterine retraction is not to be feared, and these conditions are secured by Fowler's position and ergot. Vaginal irrigation should be abandoned. The author prefers Fowler's position where drainage is needed. Collections of pus situated high up in the pelvis are best left alone until weeks or months after the acute process has terminated. Posterior colpotomy is an operation, however, that the author admits is of great value in selected cases. While employing operative treatment in general suppurative peritonitis, it should not be extensive; the abdominal contents should be disturbed as little as possible. An incision is made in the mid-line, in both flanks and through the cul-de-sac. A gauze drain is inserted and the patient is placed in Fowler's position. Still, the results of operation for general peritonitis have been poor, and the author states that in many cases a non-operative form of treatment until definite localization has been determined *will give as good results as any other.*

Two Cases of Intracranial Cerebral Hemorrhage in the New Born Relieved by Operation. By C. SIMMONS, Boston. *Boston Medical and Surgical Journal*, January 11, 1912.

Simmons reports two cases of subdural hemorrhage in the new born relieved by operation. In the first case the hemorrhage was bilateral; in the second unilateral. The operation consisted simply of an incision through the coronal suture and allowing the blood to escape. The first patient is now over a year old and is properly normal. The second case was only newly operated upon.

The author reviews the subject summarily. Cushing in 1905 placed the operation on a sound basis for the first time. These patients usually die within a short time after birth; or if they recover epilepsy and spastic paralyses are likely to ensue. The blood comes, as a rule, from one of the large veins over the cerebral cortex, and is usually situated on the cerebral cortex, being greatest over the upper portion. The symptoms are those of cerebral pressure. The child is irritable, does not nurse, is pale and appears sick, the fontanelles are tense and do not pulsate. The respirations become shallow, the pulse is rapid and full and there may be cyanosis. Water localizing symptoms may or may not be present. In doubtful cases lumbar puncture may reveal heavy fluid. The author is of the opinion that the osteoplastic flap recommended by Cushing may not be necessary. In his two cases, such a flap was not made, and the hemorrhage was easily removed through a simple coronal incision.

Strangulated Femoral Hernia. JOHN DOUGLAS, New York. *Journal of the American Medical Association*, January 30, 1912.

Femoral hernias may exist without giving symptoms that are noticed as serious until strangulation occurs, as happened in several of the cases reported. One of the most frequent errors in diagnosis is the mistaking of a small femoral hernia for an enlarged or broken down femoral gland. The impulse on coughing is lost and the percussion note when the sac fills with fluid is no longer tympanitic and when perforation and gangrene occur the signs of suppuration appear in the mass. In some cases, however, the general abdominal symptoms mask everything else and the first symptoms of strangulation may be general abdominal pain and vomiting. A superficial examination may fail to relieve a small strangulated femoral hernia in a fleshy patient and the femoral ring should always be carefully examined. His conclusions are given as follows: "1. Because of the danger of strangulation and inability to cure by other than operative measures, operation should be advised when a diagnosis of femoral hernia is made. 2. Sufficiently early diagnosis and operation would prevent the necessity of intestinal resection, and thus lessen the mortality. 3. Intractable vomiting with pain, either abdominal or localized in the groin, especially in women, should indicate careful examination of the femoral rings, even before it is obvious that intestinal obstruction exists. 4. Operation should be performed as soon as the diagnosis of strangulated femoral hernia is made, if gentle attempts at reduction fail. 5. If the strangulated intestine is damaged beyond viability, resection and anastomosis should be performed. When there is a sufficiently long mesentry not to hamper the operation, this may be done through the primary incision made over the femoral ring; otherwise a secondary abdominal incision should be made. 6. Except in the most desperate

cases, when the patient's condition is so extremely bad that it is impossible to perform an anastomosis, an enterostomy, even as a temporary resort, should not be done."

A Phenol Injection Treatment for Sphenopalatine Ganglion Neuralgia. G. SLUDER, St. Louis. *Journal American Medical Association,* Dec. 30, 1911.

Sluder says that alcohol injections, such as are used satisfactorily on the nerve trunk, have not given him satisfaction in the severe form of sphenopalatine neuralgia described by him in 1907. They have given relief for short periods of time only and always cause considerable, and sometimes very great, pain which may last for several days For the lesser grades of this neuralgia the alcohol injections have proved curative. He has found in the severer forms that 5 per cent. phenol in alcohol, injected into the sphenopalatine ganglia to the amount approximately of one drop, is painless and apparently curative for the various forms of neuralgia. Whether it would prove curative for the various forms of peripheral neuralgia he is not sure, but sees no reason why it would not. In his method he injects a cocainized ganglion, the cocain having been soaked into it from the mucous membrane covering the sphenopalatine forearm. A straight needle is then introduced from before, backward and upward under the posterior tip of the middle turbinate a distance of 5 to 6 mm. A case is reported and he says he has used this method in ten cases with good results. There has been no instance of phenol gangrene in connection with this treatment.

Sodium Hydroxid for Sterilizing Instruments. I. M. HELLER, New York. *Journal American Medical Association,* August 26, 1911.

Heller speaks of the disadvantages of carbonate or bicarbonate of sodium solutions for boiling instruments for disinfecting purposes. Instruments, especially if plated, when boiled in such solution, come out covered with a white scum, are slippery and less quickly dried and are likely to turn black, especially if they have any blood left on them. He recommends, instead, the use of sodium hydroxid or hydrate, commonly called caustic soda, which has not these disadvantages and is only somewhat more expensive, but so little is needed that this is a matter of small moment. About 38 grains, or three-fourths of an inch of stick caustic to a quart of water, makes a solution of the proper strength. He claims no originality for this suggestion as his attention was called to the fact by H. Leiter, the instrument manufacturer of Vienna. Another little point worth mentioning is the use of cocoa butter lightly rubbed on the instruments so as to deposit over them a thin film. This is better than petrolatum as it is not greasy to the touch, and does not attract or hold dust, but is equally effective in preventing rust.

Lymphatic Varicocele. F. C. MADDEN, Cairo. *Lancet,* January 6, 1912.

Madden reports three cases presenting the usual signs and symptoms of varicocele, but at operation, instead of a dilatation of the veins, the lymphatics were found dilated tortuous. Madden believes the condition was due to filariasis, although in neither of the cases could embryos be found in the blood. The author recommends excision of the lymphatics for this condition.

Circular Suture, Anastomosis and Transplantation of Bloodvessels. (*Ueber die Zirculaeren Gefaesznachte und Arttrienvenenamastomosen, sowie ueber die Gefaesztransplantationen.*) H. YAMANGUPCHI, Tokio. *Deutsch Zeitschrift für Chirurgia,* October, 1911.

The author bases his observations upon extensive experimental work, in part the repetition of experiments of other observers, in part along lines of his own. He finds that divided arteries and veins are readily sutured by the generally employed circular suture, and that the end results are almost invariably good. Failure is due to faulty technic.

The best structure to be implanted in the defect made by removal of a section of an artery is a section of another artery from the same individual. It is of practical importance to note that a vein of corresponding size may also be employed for implantation in an arterial defect, provided it is from the same individual. Under such circumstances the venous wall rapidly hypertrophies from the arterial blood pressure and aneurisms or secondary hemorrhages do not occur. It is well known that almost any vein in the human being can safely be excised.

Heteroplastic transplantation of bloodvessels from the same or from different species may be successful, but the transplant slowly dies. The resultant tube-like scar may be dangerous to the individual since aneurismal dilatations or secondary hemorrhages may occur. On the other hand, autoplastic transplants or transplants from other individuals of the same species may be successful, even if the transplant has been preserved in solutions for some time.

Circular arterio-venous anastomosis is, technically, easy of execution. The experimental results are good; it cannot as yet be definitely determined through which route the blood returns to the heart.

Furunculosis as a Cause of Death. L. T. HARRIS, New York. *New York Medical Journal,* November 11, 1911.

That an ordinary furuncle should not always be regarded lightly is exemplified by the following case: After passing through uneventfully an attack of furunculosis about the face and neck, the patient acquired another furuncle on the back of the neck. The plug was easily removed, the cavity was treated with pure phenol and the whole dressed wet. Temperature at onset 102° F. Twenty-four hours later the temperature was 104° F., and there was severe headache. Three days later the patient died of sepsis and a pure culture of staphylococcus aureas was found in the blood during life. Symptoms of cranial sinus thrombosis appeared within 24 hours of death. The patient was not diabetic.

Section of the Posterior Spinal Nerve-Roots for Relief of Gastric Crises and Athetoid and Choreic Movements. *Report of two cases.* R. WINSLOW and I. J. SPEAR, Baltimore. *Journal of the American Medical Association,* January 27, 1912.

Winslow and Spear report two cases of posterior nerve-root section, one for the relief of gastric crises of tabes in which the posterior roots of the seventh, eighth, ninth and tenth thoracic nerves were divided; the other of athetoid and choreiform movements in a lad of 17 in whom several posterior roots from the lumbar enlargement on the left side were severed. In both cases there was uninterrupted recovery from the operation, and the vomiting was relieved in the first case and the athetoid movements suppressed on the left side in the second, though they have, since the operation, increased on the other side. The sensory findings were incomplete before operation in the first case, hence no valuable deductions can be made. In the second case, owing to the uncertainty of the roots cut, it is impossible to attribute to any special spinal nerves the disturbances remaining. In Case 1 there is a definite anesthesia in an irregular band across the lower abdomen, extending posteriorly over the lower lumbar region. In Case 2 there is an anesthesia over the outer and dorsal surface of the left foot, which apparently did not exist before the operation.

Gunshot wound of the pulmonary vein of the left lower lobe and its cure by ligation. (*Lieber Schussverletzung der Vena Pulmonalis des linken Unterlappens and Heilung durch Unterbindung.*) HEILE, Wiesbaden, *Berliner Klinische Wochenschrift,* Dec. 25, 1911.

In attempt at suicide, a young man shot himself in the left fourth intercostal space. There ensued all evidences of progressive internal hemorrhage and the patient was promptly operated upon. The left pleura was full of blood which came from a wound in the pulmonary vein of the lower lobe. It was impossible to suture the wound, and the vein was ligated with two ligatures, one on either side. Under heroic stimulation the patient was brought out of shock and recovered. He was discharged at the end of two weeks. The surprising part was that no evidence of disturbance in lung function was noted after the operation, with the exception of a slight friction rub on the second day. Physical examination at the time of discharge revealed perfectly normal conditions.